



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

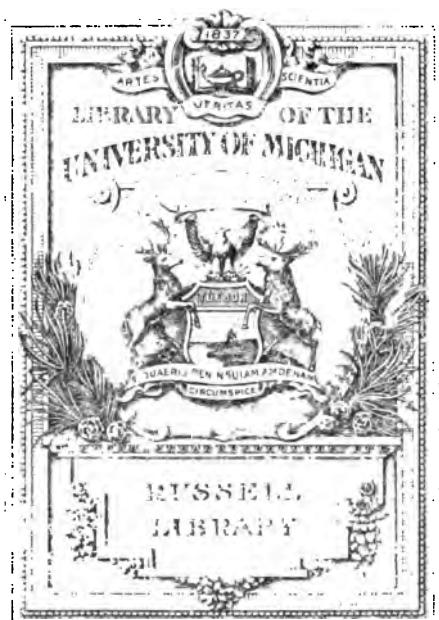
- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

B 1,071,147





[A small, horizontal, bracket-like mark.]

Q
1.
A





R E C O R D S

OF THE

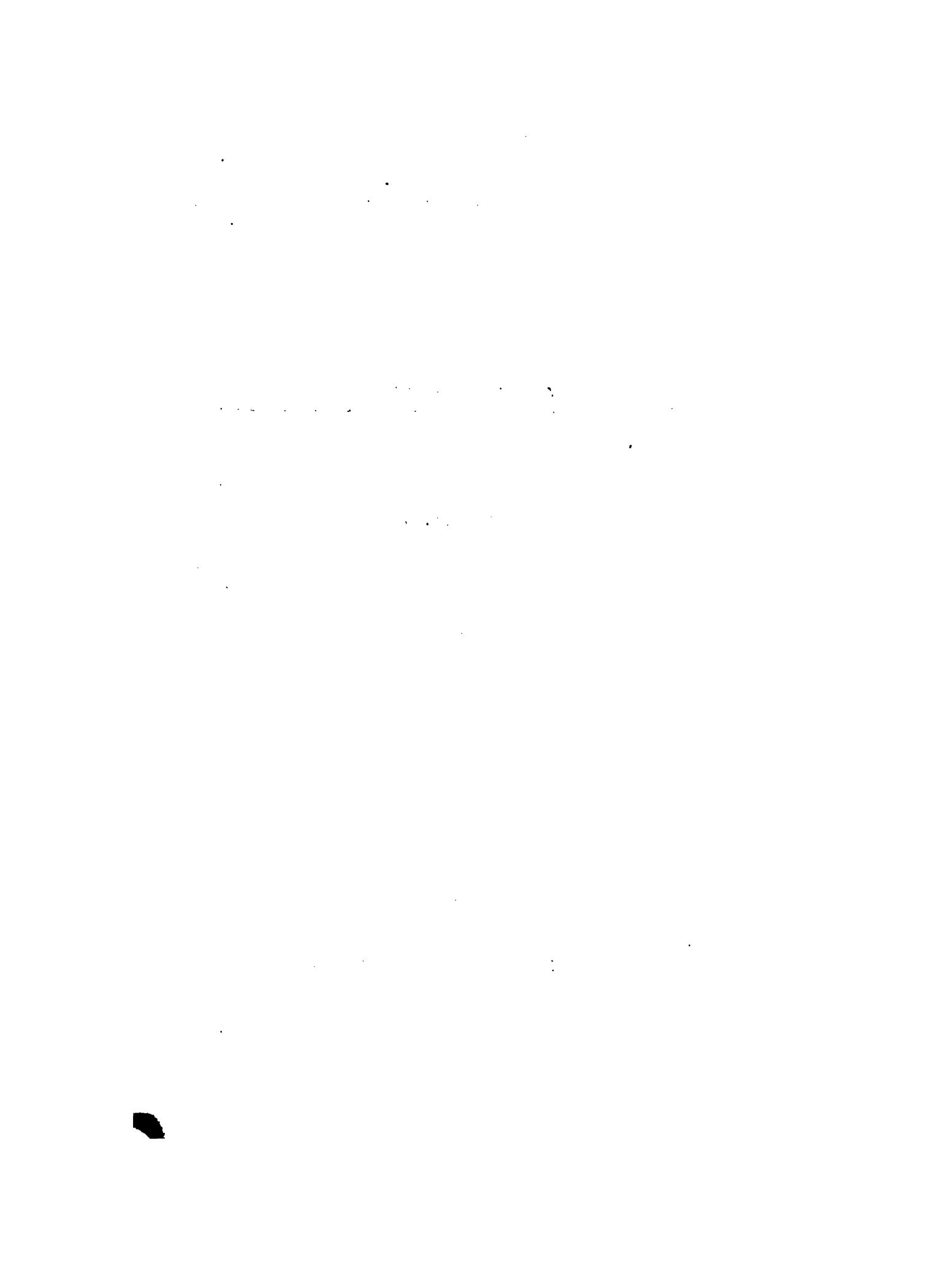
SOCIETY OF NATURALISTS,

E. U. S.

VOLUME I.,

PART FIRST.

BOSTON:
PUBLISHED BY THE SECRETARY.
1884.



R E C O R D S .

—

—

THE CONSTITUTION,

**As it stands after the revision, in accordance with the amendments adopted
at the New York meeting, December, 1883.**

ARTICLE I.

NAME AND OBJECTS.

SECTION I. This association shall be called The Society of Naturalists of the Eastern United States.

SECT. II. The object of this society shall be the association of working naturalists for the discussion of methods of investigation and instruction, laboratory technique and museum administration, and other topics of interest to investigators and teachers of Natural History; and for the adoption of such measures as shall tend to the advancement and diffusion of the knowledge of Natural History in the community.

ARTICLE II.

MEMBERS.

SECTION I. Membership in this society shall be limited to persons professionally engaged in some branch of Natural History as Instructors in Natural History, Officers of Museums and other Scientific Institutions, Physicians, and others. Any member may present to the Executive Committee names of candidates for membership, and those candidates who

are approved by the Executive Committee may be elected to membership by a majority of the members present at any meeting of the society.

SECT. II. Each member shall pay to the Treasurer an annual assessment of two dollars, which shall be considered due at the annual meeting. The name of any member two years in arrears for annual assessments shall be erased from the list of the society; and no such person shall be restored until he has paid his arrearages or has been reelected.

ARTICLE III.

OFFICERS.

SECTION I. The officers of this society shall consist of a President, two Vice-Presidents, a Secretary, and a Treasurer.

SECT. II. These officers shall be elected by ballot at the annual meeting of the society, and their official term shall commence at the close of the annual meeting.

SECT. III. The same person shall not be eligible as President more than two successive years, nor as Vice-President more than three successive years.

SECT. IV. The officers named in Section I. shall discharge the duties usually assigned to these respective officers; they, together with two members elected from the society at large, shall constitute the executive committee. The executive committee shall recommend to the society from time to time such measures as they may deem expedient for the purposes of the society, besides discharging the specific duties assigned to them by this constitution.

SECT. v. Vacancies in the board of officers, occurring by death resignation, or otherwise, may be filled by election by ballot at any meeting of the society. A vacancy in the secretaryship or treasurership occurring in the interval of the meetings of the society, may be filled by appointment by the Executive Committee; but the person so appointed shall hold office only until the next meeting of the society.

ARTICLE IV.

MEETINGS.

SECTION I. Meetings of the society may be held in such places as may from time to time be designated by the society; no meetings shall be held without the territory in Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, and the District of Columbia.

SECT. II. The annual meeting shall be held during the week following Christmas, unless otherwise ordered by the Executive Committee.

SECT. III. Special meetings may be appointed at any time by a vote of the society or of the executive committee.

ARTICLE V.

QUORUM.

Seven members shall constitute a quorum of the society, and three a quorum of the Executive Committee.

ARTICLE VI.

ACCOUNTS.

A committee shall be appointed at each annual meeting to audit the accounts of the treasurer for the year closing with that meeting.

ARTICLE VII.

AFFILIATED SOCIETIES.

It shall be the policy of this society, by correspondence and otherwise, to encourage the formation and coöperate in the work of societies of similar name and object in other parts of the country.

ARTICLE VIII.

BY-LAWS.

By-Laws recommended by the Executive Committee may be adopted at any meeting by a majority vote.

ARTICLE IX.

AMENDMENTS.

Amendments to this constitution, recommended by the Executive Committee, may be adopted at any annual meeting by a vote of two-thirds of the members present.

BY-LAWS.

I. A committee of three, to include the Secretary, shall be appointed by the Executive Committee to arrange a programme for each meeting.

II. The following persons shall be considered professionally engaged in natural history within the meaning of Article II., Section 1: — Only those who regularly devote a considerable portion of their time to the advancement of natural history; *first*, those who have published investigations in pure science of acknowledged merit; *second*, teachers of natural history, officers of museums of natural history, physicians, and others who have essentially promoted the natural-history sciences by original contributions of any kind.

[The committee appointed to draft this by-law feel that its importance renders it necessary for the by-law to be laid before the society for its action, but by the previous vote of the society the by-law will stand until further action upon it. — *Secretary.*] □

LIST OF OFFICERS FOR 1884.

President, Professor ALPHEUS HYATT.
Vice-Presidents, { Professor H. N. MARTIN.
 Professor A. S. PACKARD, JR.
Secretary, Dr. CHARLES SEDGWICK MINOT.
Treasurer, Professor WM. B. SCOTT.

*Members of the Executive Committee elected from the
Society at Large.*

Professor H. CARVILL LEWIS. **Mr. LESTER F. WARD.**

LIST OF MEMBERS.

[An asterisk designates original membership.]

***ALLEN, HARRISON, M.D.** Comparative Anatomy and Physiology.
 Professor of Physiology, University of Pennsylvania.
 117 South 20th st., Philadelphia, Penn.

***ASHBURNER, CHARLES A.** Geology.
 Geologist of the Pennsylvania State Survey.
Philadelphia, Penn.

***BAIRD, SPENCER F., M.D., LL.D.** Zoölogy.
 Secretary of the Smithsonian Institution; Director of the
 U.S. National Museum; Commissioner of Fisheries.
Smithsonian Institution, Washington, D.C.

LIST OF MEMBERS.

II

- ***BEAN, TARLETON H., M.D., M.S.** Ichthyology.
Curator, Dep't of Fishes, Editor of Proceedings, National
Museum.
National Museum, Washington, D.C.
- BENEDICT, JAMES E.** Natural History.
Naturalist U.S. Fish Commission, Str. "Albatross."
Smithsonian Institution, Washington, D.C.
- ***BICKMORE, ALBERT S.** Anthropology and Zoölogy.
Superintendent of the American Museum of Natural History.
American Museum, Central Park, N.Y.
- BOLTON, H. CARRINGTON, A.M., Ph.D.** Mineralogy, Chemistry.
Professor of Chemistry and Mineralogy, Trinity College.
Trinity College, Hartford, Conn.
- ***BOWDITCH, HENRY P., A.M., M.D.** Physiology.
Professor of Physiology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- ***BRITTON, N. L., E.M., Ph.D.** Botany and Geology.
Assistant in Geology and Botany, School of Mines, Columbia
College, and Botanist, Geological Survey of New Jersey.
School of Mines, Columbia College, N.Y.
- ***BRUSH, GEORGE J., A.M.** Mineralogy.
Director of, and Professor of Mineralogy at, the Sheffield,
Scientific School.
Sheffield Scientific School, New Haven, Conn.
- ***BURGESS, EDWARD, A.B.** Entomology.
Secretary of the Boston Society of Natural History, and
Instructor in Entomology at Bussey Institution of Harvard
University.
Boston Society of Natural History, Boston, Mass.
- ***CLARKE, SAMUEL F., Ph.B., Ph.D.** Zoölogy.
Professor of Natural History, Williams College.
Williamstown, Mass.
- ***COMSTOCK, J. HENRY, B.S.** Entomology.
Professor of Economic Entomology and General Invertebrate
Zoölogy, Cornell University.
Cornell University, Ithaca, N.Y.
- ***CONN, HERBERT W., A.B.** Zoölogy.
Assistant in Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.

- *COPE, EDWARD D. Palæontology and Zoölogy.
2100 Pine st., Philadelphia, Penn.
- *COUES, ELLIOTT, A.M., M.D., Ph.D. Vertebrates, Bibliography.
Smithsonian Institution, Washington, D.C.
- *CROSBY, W. O., S.B. Geology.
Assistant Professor of Mineralogy and Lithology, Massachusetts Institute of Technology.
Institute of Technology, Boston, Mass.
- *CUTTING, H. A., A.M., M.D., Ph.D. Geology.
State Geologist and Fish Commissioner of Vermont.
Lunenburgh, Vermont.
- *DANA, JAMES D., Ph.D., LL.D. Mineralogy, Zoölogy, Geology.
Professor of Geology, Yale College.
Yale College, New Haven, Conn.
- *DAVIS, WILLIAM M., S.B., M.E. Geology.
Instructor in Geology, Harvard College.
Museum of Comparative Zoölogy, Cambridge, Mass.
- *DEWEY, FREDERIC P., Ph.B. Metallurgy.
Curator of Metallurgy, U.S. National Museum.
National Museum, Washington, D.C.
- *DILLER, J. S. Micropetrography and Geology.
Assistant Geologist U.S. Geological Survey.
U.S. Geological Survey, Washington, D.C.
- *DIMMOCK, GEORGE, Ph.D. Zoölogy.
Cambridge, Mass.
- *DONALDSON, HENRY H., A.B. Physiology.
Assistant in Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- *DUDLEY, WILLIAM R., M.S. Cryptogamic Botany.
Assistant Professor of Cryptogamic Botany, Cornell University.
Cornell University, Ithaca, N.Y.
- *DUTTON, C. E. Geology.
Captain of Ordnance, U.S.A.
U.S. Geological Survey, Washington, D.C.
- *DWIGHT, WILLIAM B., B.A., M.A., Ph.B. Zoölogy.
Professor of Zoölogy and Curator of the Museum, Vassar College, etc.
Vassar College, Poughkeepsie, N.Y.

- *EMERSON, B. K., Ph.D. Geology and Mineralogy.
Professor of Geology, Amherst College.
Amherst, Mass.
- *EMERTON, JAMES H. Zoölogy.
Assistant in Zoölogy, Yale College.
Yale College, New Haven, Conn.
- *EMMONS, S. F. Geology.
Geologist of the U.S. Geological Survey.
Geological Survey, Washington, D.C.
- *FARLOW, WM. G., A.B., M.D. Botany.
Professor of Cryptogamic Botany, Harvard College.
Harvard College, Cambridge, Mass.
- *FERNALD, C. H., A.M. Microlepidoptera.
Professor of Natural History, Maine State College.
Orono, Maine.
- *GAGE, SIMON H., S.B. Vertebrate Morphology.
Assistant Professor of Physiology, and Lecturer on Microscopical Technology, Cornell University.
Cornell University, Ithaca, N.Y.
- *GERRISH, FREDERICK HENRY, A.M., M.D. Anatomy.
Professor of Anatomy, Bowdoin College.
675 Congress street, Portland, Maine.
- *GILBERT, G. K. Geology.
Geologist of the U.S. Geological Survey.
Geological Survey, Washington, D.C.
- *GILL, THEODORE, M.D., Ph.D. Ichthyology.
Smithsonian Institution, Washington, D.C.
- *GOODALE, GEORGE L., A.M., M.D. Botany.
Professor of Botany, Harvard College.
Harvard College, Cambridge, Mass.
- *GOODE, G. BROWN, A.M. Zoölogy.
Assistant Director U.S. National Museum.
National Museum, Washington, D.C.
- GRATACAP, L. P., M.A., Ph.B. Mineralogy and Geology.
Assistant Curator of Geology, American Museum of Natural History, New York.
American Museum, Central Park, New York, N.Y.
- GRAY, WILLIAM M., M.D. Physiology.
Demonstrator of Histology, University of Pennsylvania.
University of Pennsylvania, Philadelphia, Penn.

- ***GREENLEAF, R. W., A.B.** Botany.
53 High street, Charlestown, Mass.
- HAGUE, ARNOLD.** Geology and Petrography.
Geologist U.S. Geological Survey.
American Museum, Central Park, N.Y.
- ***HALL, G. STANLEY, A.M., Ph.D.** Psychology.
Professor of Psychology, Johns Hopkins University.
Baltimore, Md.
- ***HALL, JAMES, M.S., A.M., M.D., LL.D.** Geology, Palæontology.
State Geologist of New York, Director of the State Museum
of Natural History.
State Museum, Albany, N.Y.
- ***HAYDEN, F. V., M.D., LL.D.** Geology.
Geologist U.S. Geological Survey.
1803 Arch street, Philadelphia, Penn.
- ***HEILPRIN, ANGELO.** Palæontology and Geology.
Professor of Invertebrate Palæontology and Curator
in charge, Academy of Natural Sciences of Phila-
delphia.
Academy of Natural Sciences, Philadelphia, Penn.
- ***HENSHAW, SAMUEL.** Zoölogy.
Assistant, Boston Society of Natural History.
Boston Society of Natural History, Boston, Mass.
- ***HITCHCOCK, C. H., Ph.D.** Geology.
Professor of Geology and Mineralogy, Dartmouth College.
Hanover, N.H.
- ***HOLDER, J. B., M.D.** Zoölogy.
Curator of Vertebrate Zoölogy, Am. Museum Nat. History.
American Museum, Central Park, N.Y.
- ***HORN, GEORGE H., M.D.** Entomology.
President of the American Entomological Society, Corre-
sponding Secretary Academy of Natural Sciences of Phila-
delphia.
874 North 4th street, Philadelphia, Penn.
- ***HYATT, ALPHEUS, S.B.** Palæontology and Zoölogy.
Curator of the Boston Society of Natural History, and Pro-
fessor of Zoölogy and Palæontology at the Massachusetts
Institute of Technology.
Boston Society of Natural History, Boston, Mass.

- IDDINGS, JOSEPH P., Ph.B. Geology and Lithology.
Assistant Geologist, U.S. Geological Survey.
American Museum, Central Park, New York, N.Y.
- JEFFRIES, J. AMORY, A.B. Anatomy.
78 Devonshire street, Boston, Mass.
- *JULIEN, ALEXIS A., Ph.D. Petrography.
Assistant in Chemistry, School of Mines, Columbia College.
School of Mines, Columbia College, New York, N.Y.
- *KIDDER, J. H., A.M., M.D. Chemistry.
Surg. U.S.N., Chemist U.S. Fish Commission.
Smithsonian Institution, Washington, D.C.
- *KINGSLEY, J. S., A.B. Zoölogy.
Editor of "The Standard Natural History."
Malden, Mass.
- *LEE, LESLIE A., M.A. Geology and Biology.
Professor of Geology and Biology, Bowdoin College.
Brunswick, Maine.
- *LEWIS, H. CARVILL, A.M. Geology and Mineralogy.
Professor of Mineralogy, Academy of Natural Sciences of Philadelphia, and Lecturer on Geology and Palæontology at Haverford College, Haverford, Penn.
Academy of Natural Sciences, Philadelphia, Penn.
- *LIBBEY, WILLIAM, Jr., A.M., Sc.D. Histology.
Professor of Physical Geography, Princeton College, and Vice-Director of the E.M. Museum of Geology and Archæology.
Princeton, N.J.
- *LOCKINGTON, W. N. Zoölogy.
1104 Walnut street, Philadelphia, Penn.
- *McGEE, W. J. Geology.
Assistant Geologist, U.S. Geological Survey.
U.S. Geological Survey, Washington, D.C.
- *MACCOSKIE, GEORGE, D.Sc., LL.D. Biology.
Professor of Biology, Princeton College.
Princeton, N.J.
- *MARCOU, JOHN B. Geology.
Assistant Geologist, U.S. Geological Survey.
U.S. National Museum, Washington, D.C.

- ***MARSHALL, JOHN P., A.M.** Mineralogy and Geology.
Professor of Mineralogy and Geology, Tufts College.
College Hill, Mass.
- ***MARTIN, H. NEWELL, A.M., M.D., D.Sc.** Physiology.
Professor of Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- ***MEEHAN, THOMAS.** Botany.
Botanist to the Pennsylvania State Board of Agriculture, Vice-President, Academy of Natural Sciences, Philadelphia.
Germantown, Penn.
- ***MERRIAM, C. HART, M.D.** Vertebrates.
Locust Grove, Lewis Co., N.Y.
- ***MERRILL, GEORGE P., M.S.** Lithology.
Acting Curator of Lithology, U.S. National Museum.
National Museum, Washington, D.C.
- ***MERRILL, N. F., S.B., Ph.D.** Lithology.
Salem, Mass.
- ***MINOT, CHARLES SEDGWICK, S.B., S.D.** Biology.
Instructor in Embryology and Histology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- ***MORSE, EDWARD S., Ph.D.** Anthropology and Zoölogy.
Director of the Peabody Academy of Science, Salem, Mass.
Salem, Mass.
- ***NEWBERRY, J. S., M.D., LL.D.** Geology.
Professor of Geology, School of Mines, Columbia College.
School of Mines, Columbia College, New York, N.Y.
- ***NILES, WILLIAM H., A.M., Ph.B.** Physical Geography
and Historical Geology.
Professor of Geology and Geography, Massachusetts Institute of Technology.
Mass. Institute of Technology, Boston, Mass.
- ***OSBORN, HENRY F., Sc.D.** Vertebrate Morphology.
Professor of Comparative Anatomy, Princeton College.
Princeton, N.J.
- ***PACKARD, A. S., Jr., A.M., M.D., Ph.D.** Zoölogy.
Professor of Zoölogy and Geology, Brown University.
Brown University, Providence, R.I.

- ***PEALE, A. C., A.M., M.D.** Geology.
Geologist, U.S. Geological Survey.
Geological Survey, Washington, D.C.
- ***PECKHAM, GEORGE W., M.D.** Biology.
Teacher of Biology, Milwaukee High School.
Milwaukee, Wisconsin.
- PIERSOL, GEORGE A., M.D.** Histology.
Demonstrator of Normal Histology, Medical Department,
University of Pennsylvania.
University of Pennsylvania, Philadelphia, Penn.
- ***PILLSBURY, J. H.** Biology.
Science Teacher, High School, Springfield, Mass., and Instructor in Biology, Smith College.
Springfield, Mass.
- ***POWELL, J. W., Ph.D., LL.D.** Anthropology and Geology.
Director of the U.S. Geological Survey and of the Bureau of Ethnology, Smithsonian Institution.
Geological Survey, Washington, D.C.
- ***PRENTISS, A. N., M.S.** Botany.
Professor of Botany, Horticulture and Arboriculture, Cornell University.
Cornell University, Ithaca, N.Y.
- ***PRUDDEN, T. MITCHELL, Ph.B., M.D.** Normal and Pathol. Histology.
Director of the Physiological and Pathological Laboratory of the Alumni Association of the College of Physicians and Surgeons, N.Y.
114 East 26th street, New York, N.Y.
- ***PUTNAM, FREDERICK W.** Archæology and Ethnology.
Curator of the Peabody Museum of Archæology and Ethnology, in connection with Harvard University, Permanent Secretary of the American Association for the Advancement of Science, and Massachusetts State Commissioner on Inland Fisheries.
Peabody Museum, Cambridge, Mass.
- RANDOLPH, N. ARCHER, M.D.** Physiology.
Assistant Demonstrator of Physiology, University of Pennsylvania, and Instructor in Physiology, Towne Scientific School.
3706 Locust street, Philadelphia, Penn.

- ***RATHBUN, RICHARD, M.S.** Invertebrates.
Curator, Dep't of Marine Invertebrates, National Museum.
U.S. National Museum, Washington, D.C.
- REICHERT, EDWARD T., M.D.** Physiology.
Demonstrator of Physiology, University of Pennsylvania.
University of Pennsylvania, Philadelphia, Penn.
- ***RICE, WILLIAM NORTH, Ph.D.** Geology.
Professor of Natural History, Wesleyan University.
Middletown, Conn.
- ***RIDGWAY, ROBERT.** Ornithology.
Curator, Dep't of Birds, U.S. National Museum.
Smithsonian Institution, Washington, D.C.
- ***RILEY, C. V., A.M., Ph.D.** Entomology.
Entomologist of the U.S. Department of Agriculture, and
Curator of Insects, U.S. National Museum.
1700 13th street, N.W., Washington, D.C.
- ***ROBINSON, JOHN.** Botany.
Treasurer in charge of Museum of the Peabody Academy of
Science at Salem.
Peabody Academy, Salem, Mass.
- ***ROTHROCK, J. T., M.D., B.S.** Botany.
Professor of Botany, University of Pennsylvania.
West Chester, Chester Co., Penn.
- ***RUSSELL, ISRAEL C.** Geology.
U.S. Geological Survey, Washington, D.C.
- ***SARGENT, CHARLES S.** Botany.
Professor of Arboriculture, Harvard University, and Direc-
tor of the Arnold Arboretum.
Brookline, Mass.
- ***SCOTT, WILLIAM B., Ph.D.** Animal Morphology.
Professor of Geology and Palaeontology, Princeton College.
Princeton, N.J.
- ***SCUDDER, S. H., A.M., S.B.** Entomology and Palaeontology
Editor-in-Chief of "Science."
Cambridge, Mass.
- ***SEDGWICK, WILLIAM T., Ph.D.** Biology.
Assistant Professor of Biology, Massachusetts Institute of
Technology.
Massachusetts Institute of Technology, Boston, Mass.

- *SHAKESPEARE, E. O., A.M., M.D. Histology.
 Ophthalmic Surgeon and Pathologist to Philadelphia (Charity)
 Hospital.
 1336 Spruce street, Philadelphia, Penn.
- *SHARP, BENJAMIN, M.D., Ph.D. Animal Morphology.
 Professor of Invertebrate Zoölogy, Academy of Natural
 Sciences of Philadelphia.
 Academy of Natural Sciences, Philadelphia, Penn.
- *SHUFELDT, R. W., M.D. Anatomy of Vertebrates.
 Captain, Medical Department, U.S.A.
 Army Medical Museum, Washington, D.C.
- SMITH, ROBERT MEADE, A.M., Ph.D. Physiology.
 Professor of Comparative Physiology, University of Penn-
 sylvania.
 332 South Twenty-first street, Philadelphia, Penn.
- SMITH, SANDERSON. Conchology.
 New Brighton, Staten Island, N.Y.
- *SMITH, SIDNEY I., Ph.B. Crustacea.
 Professor of Comparative Anatomy, Yale College.
 Yale College, New Haven, Conn.
- *STEVENSON, J. J., Ph.D. Geology.
 Professor, University of the City of New York.
 University, Washington Square, New York, N.Y.
- *TRUE, FREDERICK W., M.S. Librarian and Curator of Mammals, U.S. National Museum.
 National Museum, Washington, D.C.
- *TRYON, G. W., Jr. Conchology.
 Conservator of the Conchological Department of the
 Academy of Natural Sciences of Philadelphia.
 Academy of Natural Sciences, Philadelphia, Penn.
- *TYLOR, J. M. Professor.
 Amherst, Mass.
- *VAN VLECK, B. H., S.B. Biology.
 Instructor in Biology and Physiology in Boston University.
 Boston Society of Natural History, Boston, Mass.
- *WADSWORTH, M. E., A.M., Ph.D. Mineralogy and Geology.
 Assistant in Lithology, Museum Comparative Zoölogy.
 Museum of Comparative Zoölogy, Cambridge, Mass.

- *WALCOTT, C. D. Palæontology and Geology.
Palæontologist, U.S. Geological Survey, and Hon. Curator
of invertebrate palæozoic Fossils, U.S. National Museum.
National Museum, Washington, D.C.
- WARD, HENRY A., A.M. Natural Science.
Head of Ward's Natural Science Establishment.
No. 2 College avenue, Rochester, N.Y.
- *WARD, LESTER F., A.M. Sociology, Vegetable Palæontology, and Botany.
Geologist, U.S. Geological Survey, and Honorary Curator of
Fossil Plants, U.S. National Museum.
P.O. Box 585, Washington, D.C.
- *WARREN, J. W., A.B., M.D. Physiology.
Assistant in Physiology, Harvard Medical School.
107 Boylston street, Boston, Mass.
- *WHITE, C. A., A.M., M.D. Invertebrate Palæontology.
Curator of Fossil Invertebrates, U.S. National Museum, and
Palæontologist, U.S. Geological Survey.
U.S. National Museum, Washington, D.C.
- WHITFIELD, R. P., M.A. Palæontology.
(Late Professor at Troy, N.Y.), Curator of Geology,
American Museum of Natural History.
American Museum, Central Park, N.Y.
- *WHITMAN, C. O., Ph.D. Animal Morphology.
Assistant in Zoölogy, Museum Comparative Zoölogy.
Museum of Comparative Zoölogy, Cambridge, Mass.
- *WHITNEY, W. F., M.D. Pathology.
Curator of the Museum of the Harvard Medical School.
Harvard Medical School, Boston, Mass.
- *WILDER, BURT G., B.S., M.D. Vertebrate Morphology.
Professor of Physiology, Comparative Anatomy and Zoölogy, Cornell University, and Professor of Physiology, Medical School of Maine.
Cornell University, Ithaca, N.Y.
- WILLIAMS, GEORGE H., A.B., Ph.D. Mineralogy.
Associate in Mineralogy and Geology, Johns Hopkins University.
Johns Hopkins University, Baltimore.

- *WILLIAMS, HENRY S., Ph.D. Palæontology.
Professor of Palæontology, Cornell University, and Assistant
Geologist, U.S. Geological Survey.
Cornell University, Ithaca, N.Y.
- *WILLIAMS, S. G., A.M., Ph.D. Economic Geology.
Professor of Geology, Cornell University.
Cornell University, Ithaca, N.Y.
- *WILSON, EDMUND B., Ph.B., Ph.D. Animal Morphology.
Lecturer on Biology, Williams College.
Williamstown, Mass.
- *WORTMAN, J. L. Vertebrate Palæontology and Zoölogy.
Anatomist to the U.S. Army Medical Museum.
Army Medical Museum, Washington, D.C.
- *WRIGHT, G. FREDERICK, Rev. Geology.
Oberlin, Ohio.
- *YARROW, H. C., M.D., Acting Asst.-Surg. U.S.A.
Herpetology.
Curator of Herpetology, U.S. National Museum.
National Museum, Washington, D.C.

ORIGINAL CALL.

The following is a copy of the original call for the first meeting, which was issued by Professor Samuel F. Clarke, of Williamstown :—

A number of American workers in Biology, desiring to have established an association of American naturalists for business purposes, extend to you a cordial invitation to join in a movement looking toward that end.

The intention is to have an annual meeting, for the purpose of discussing topics of common interest, for which, at present, no opportunity is afforded; as, for example, museum interests, in connection with which each museum director could indicate his plan of work, the special group of which he was making exhaustive collections, so that work may not be uselessly duplicated in many places; methods of museum work; methods of exhibition, etc.; methods of laboratory work; laboratory technique; new and valuable points in staining, mounting, cutting, and preserving of sections; systems of instruction in various departments of natural science; methods with small elective classes; with large college classes; the position which the observational sciences should hold in the college curriculum; the amount of natural science which should appear in college entrance examinations; the amount and character of such instruction in preparatory schools, etc.

It is further believed that such a society could materially influence for the better the cause of science in America; that it would have a very healthful general effect, and could exert a strong influence in many directions where at present it seems to be very much needed. It is proposed to have the first meeting, which will be preliminary to organization, and, therefore, of prime importance, at Springfield, Mass., in the Springfield High School Hall, Friday, April 10th.

The following gentlemen are interested in the enterprise, and nearly all of them will be among those present: [the names are J. M. Tylor, A. Hyatt, C. S. Minot, A. S. Packard, Jr., S. H. Scudder, H. N. Martin, W. T. Sedgwick, G. Macloskie, W. Libbey, H. F. Osborn, W. B. Scott, W. N. Rice, S. I. Smith; S. F. Clarke, (*Secretary*)].

RECORDS OF THE SOCIETY
OF
NATURALISTS OF THE EASTERN UNITED STATES.

FIRST MEETING.

SPRINGFIELD, MASS., APRIL, 1883.

FIRST DAY, APRIL 10TH.

In answer to a call issued in March, 1883, a number of naturalists met on April 10th, in the High School Hall, at 2 o'clock P.M., to discuss the advisability of forming a society of professional naturalists. Professor Alpheus Hyatt was elected to the chair, and Professor Samuel F. Clarke was elected Secretary. In response to a request from the Chair, the Secretary, who had issued the call for the meeting, made some general remarks upon the object of the movement and the degree of interest expressed therein. Professor A. S. Packard, Jr., expressed his interest in, and sympathy with, the enterprise, and suggested very valuable work of various kinds. Dr. Packard also raised the question of the feasibility of uniting this project with the American Association for the Advancement of Science. Dr. C. S. Minot spoke on this latter question, taking the ground that, as the American Association comprises a very large and varied membership and has such multifarious interests, it would be very difficult to pursue any definite line of professional work without interruption within that body; secondly, as the association meets in such widely distant localities it would be impossible to maintain a constant attendance of the same persons for continuing the same line of work; thirdly, if this enterprise be kept separate it will be a more distinct and definite, and, therefore, a much more highly effective organization.

If a few men, who are thoroughly in earnest, meet together at an appointed place and time, for a single definite purpose, the chances are all in favor of their accomplishing something worth the doing.

Professor W. N. Rice followed on the same question. He agreed in the main with the points made by Dr. Minot, and held that the character of the membership of the two organizations was decisive in regard to the advisability of uniting the two. Professor Rice then

Moved, That this be formed as a distinct organization. The motion was seconded by Dr. Packard. *Carried*.

Professor Packard then introduced the question of membership, suggesting that it be restricted to professional naturalists. Professor J. M. Tylor spoke in favor of admitting medical men. It was then, by Professor Rice,

Moved, That Museum Officers, Instructors in Natural History, Physicians, and others professionally devoted to some branch of Natural History, be eligible to membership. Seconded by Professor Tylor. *Carried*.

The question of the geographical limit within which meetings can be held was the next topic considered. After remarks by nearly all present, including the Chair, Dr. Minot

Moved, That the limits be as follows:—

The New England and Middle States and the District of Columbia; and that the meetings be peripatetic. Seconded by Professor J. H. Pillsbury. *Carried*.

Dr. Minot

Moved, That a regular meeting be held in the spring of each year; that this be considered the first of such meetings; and at each regular meeting it be determined whether any additional meeting or meetings be held that year. Seconded by Professor Rice. *Carried*.

Dr. Minot

Moved, That the officers of the society consist of a President, two Vice-Presidents, a Secretary, and a Treasurer, and that they constitute the Executive Committee of the Society. Seconded by Professor Tylor. *Carried.*

Professor Rice offered the following

Motion: That the President be reëligible once; the Vice-President reëligible twice, and that all the officers be elected annually. Seconded and *carried*.

Professor Rice

Moved, That nominations for membership be sent in to the Executive Committee, and be recommended by that committee to the society, which shall vote upon such names. Seconded and *carried*.

Professor Rice

Moved, That the society form a branch or branches in other parts of the country. Seconded and *carried*.

Professor Tylor

Moved, That the Chair appoint a committee of three to draft a constitution, and report as early as possible. Seconded and *carried*.

The Chair appointed Professor Rice, of Wesleyan University, Professor Pillsbury, of Springfield, and Professor S. F. Clarke, of Williams College.

The meeting then adjourned to meet at ten o'clock the next morning, in the same rooms.

(Signed)

SAMUEL F. CLARKE,
Secretary.

FIRST MEETING, AT SPRINGFIELD, MASS.

SECOND DAY, FRIDAY, APRIL 11TH, 1883.

Professor Hyatt in the chair. The minutes of the preceding meeting were read and adopted. The committee on the constitution were called on to report. The articles were then read by the committee, and voted upon separately by the meeting; and the constitution afterwards adopted as a whole. The by-laws were also read and adopted.

Balloting for officers then ensued, and the following were elected.

President. — Professor ALPHEUS HYATT.

Vice-Presidents. — Professor H. N. MARTIN; Professor A. S. PACKARD, Jr.

Secretary. — Professor S. F. CLARKE.

Treasurer. — Professor W. B. SCOTT.

It was

Moved, That the thanks of the society be extended to Professor Pillsbury and the Trustees of the Springfield High School building for their kindness and courtesy in providing commodious rooms for the meetings.

It was moved and *carried* that the Executive Committee have some discretionary power in recording as original members certain individuals, who could not be heard from to-day.

(Signed)

SAMUEL F. CLARKE,
Secretary.

SECOND MEETING, AT NEW YORK, N.Y.

FIRST DAY, DECEMBER 27, 1883.

SCHOOL OF MINES, COLUMBIA COLLEGE.

Morning Session.

President Alpheus Hyatt in the chair. The minutes of the preceding meeting were read and accepted. The resignation of the secretaryship by Prof. S. F. Clarke was announced by the Secretary *pro tem.*

It was moved by Prof. Wilder; and *carried*, that his resignation be accepted, and that the Chair and Secretary be instructed to express to Professor Clarke the gratitude of the society for his invaluable services in organizing the society, and acting as Secretary.

Dr. C. S. Minot was elected Secretary.

The Secretary communicated the informal report of the Executive Committee. Owing to the unorganized condition of the society, only questions of a preliminary nature could be considered by the committee. Their principal work has been in securing the adherence of as many as possible of the leading naturalists to the society, and this duty has devolved chiefly upon the President and the Secretary, at first Professor Clarke, subsequently Dr. Minot, who was appointed Secretary *pro tem.* upon Professor Clarke's departure to Europe. No efforts have been spared to secure as large an attendance and as valuable communications as possible for this meeting. Your committee believe that their success has exceeded the most sanguine expectations, and feel that the future usefulness and prosperity of the society is assured. Further information as to the work of the society will be given you by the President in his address. Your committee recommend that this be declared an annual meeting, and that hereafter the annual meetings be held during the week from Christmas to New Year's. Your committee further recommend that two members elected from the society at large be added to the Executive Committee.¹

The report of the committee was accepted.

Professor Wm. B. Scott presented the following

¹ It is intended hereafter to present each year a formal written report by the Executive Committee. — *Secretary.*

REPORT OF THE TREASURER.

Thirty-four members have paid the annual assessment, giving a total of sixty-eight dollars (\$68.00).

The expenditures to date have amounted to twelve dollars and six cents (\$12.06), paid out for printing of circulars, etc., leaving a balance on hand of fifty-five dollars and ninety-four cents (\$55.94).

W. B. SCOTT,
Treas. Soc. Nat. E.U.S.

NEW YORK, Dec. 27, 1883.

Prof. Rothrock moved that the constitution be changed so that this be declared an annual meeting, and that hereafter the annual meeting be held during the Christmas vacation. *Carried.*

In the discussion which followed, it was decided that the exact days for the meeting be determined by the Executive Committee.

The nomination of officers was called for by the chair. Prof. W. H. Niles moved that a committee be appointed by the Chair to nominate officers. Seconded and *carried*. Prof. E. D. Cope moved that the committee consist of five members; seconded, and *carried*. The Chair nominated Profs. Cope, Wilder, Niles, Whitfield, and Rothrock. Prof. Rothrock asked leave to withdraw, as there was already one member from Philadelphia upon the committee. The Chair appointed Prof. Emerson in his stead.

Prof. Heilprin moved that the recommendation of the Executive Committee that two members be added to the Executive Committee from the society at large, be adopted. Seconded and *carried*.

Prof. Rothrock moved that the Nomination Committee nominate also the two additional members of the Executive Committee. Seconded and *carried*.

The invitation of the President of the American Museum of Natural History to the society to visit the Museum was read by the Secretary. Prof. Cope moved that the invitation be accepted with thanks. *Carried* unanimously. Considerable discussion followed upon the question of the time for the visit. Prof. Osborn moved that in acknowledgment of the cordial invita-

tion from Prof. Bickmore for the society to meet at the Museum, the meeting of the society be held at the Museum on Friday afternoon, at two o'clock. Seconded.

Prof. Lee moved, as an amendment, that an extra session be held at the Museum Saturday morning. Prof. Osborn did not accept the amendment. The amendment was put and lost. The original motion was then put and *carried*.

The President inquired whether the society would postpone listening to his address. Prof. Wilder moved that the address be read now. Seconded; *carried* unanimously.

The President read his address, which was warmly received. [The address was entitled "The Business of the Naturalist," and was published in Science, vol. III, p. 44-46.]

The reading of papers was then proceeded with, as follows:—

1. Prof. T. H. GAGE. Applications of photography to the production of natural history figures and lecture-room charts. Discussed by Prof. Harrison Allen.
2. Prof. W. H. NILES. Adaptation of lectures to the instruction of large classes. Discussed by Profs. Wilder, Heilprin, and Niles and by the President.
3. Prof. JAMES HALL. Methods of preparing rock sections.

THURSDAY, DEC. 27, 1883.

SCHOOL OF MINES, COLUMBIA COLLEGE.

Afternoon Session.

President Hyatt in the chair. Twenty-seven members present.

The following papers were read:—

1. Dr. HARRISON ALLEN. On some methods of pursuing teratological research. Discussed by Profs. Scott, Wilder, Cope, Gage, and Mr. Kingsley.
2. Dr. M. E. WADSWORTH. On methods of instruction in mineralogy and petrography. Discussed by Profs. Lewis and Emerson.
3. Prof. B. G. WILDER. The arrangement of a museum of verte-

- brates. Discussed by Profs. Lewis, Allen. Dr. Allen called upon Dr. Sharp, who, in response, described Prof. Semper's "*Trockenmethode*" for the preservation of anatomical preparations. President Hyatt spoke of the value of this method, especially for the demonstration of very delicate structures. The discussion was then further continued by Profs. Heilprin, Cope, and President Hyatt.
4. Prof. E. D. Cope. Academies of Science in America. Discussed by Dr. M. E. Wadsworth, Prof. J. T. Rothrock, President Hyatt, Professors Macloskie, Heilprin.

SECOND MEETING, AT NEW YORK, N.Y.

SECOND DAY, DEC. 28, 1883.

SCHOOL OF MINES, COLUMBIA COLLEGE.

Morning Session.

President Hyatt in the chair. Thirty-eight members present. The Nominating Committee reported the following names: For President, Prof. ALPHEUS HYATT, Vice-Presidents, Profs. H. N. MARTIN, and A. S. PACKARD, Jr.; Secretary, Dr. CHARLES SEDGWICK MINOT; Treasurer, Prof. WM. B. SCOTT; Members of the Executive Committee from the society at large, Prof. H. C. LEWIS, and LESTER F. WARD. After some discussion, it was voted that the Secretary deposit the ballot; the Secretary cast the ballot, and the officers nominated were declared elected for the ensuing year.

The following new members were elected upon recommendation of the Executive Committee; Prof. HENRY A. WARD, Dr. GEORGE H. PIERSOL, Dr. R. MEADE SMITH, Dr. WILLIAM GRAY, Dr. E. T. REICHERT, Dr. N. A. RANDOLPH, Mr. J. A. JEFFRIES, Mr. J. P. IDDINGS, Mr. ARNOLD HAGUE, Prof. H. C. BOLTON, Mr. LOUIS B. GRATACAP, Mr. F. C. HILL, Prof. J. B. ELLIS, Prof. J. L. WORTMAN, Mr. SANDERSON SMITH, and Mr. GEORGE H. WILLIAMS.

Dr. C. S. Minot moved, That the Executive Committee prepare a list of persons, not professional naturalists, to be regularly invited to attend the meetings of the society as guests. Seconded and *carried*.

Prof. Cope moved, That a committee of four be appointed to coöperate with the Executive Committee to define the meaning of the term "professional naturalist." Seconded and *carried*. Prof. H. F. Osborn, moved that the entire committee established by Prof. Cope's motion, be directed to revise the constitution in accordance with the alterations made by the recent votes of the society. Seconded and *carried*.

Prof. W. H. Niles offered the following resolution:—

Resolved, That the Society of Naturalists of the Eastern United States, recognizing the great importance of a thorough knowledge of modern languages especially of German and French to students in Natural History, regard it as a hopeful sign that a conference of professors in this department is now assembled at Columbia College, and hereby expresses its hearty sympathy with their work. This motion was seconded and carried; and Profs. Niles and Cope were appointed to convey the resolution to the conference.

After some discussion as to its form, the following motion was made by Prof. H. F. Osborn: That a committee of five be appointed to present to the society some means of advancing the interests of the biological section of the American Association for the Advancement of Science.

The society voted that the new committees be appointed by the Chair.

The following papers were read:—

1. Prof. S. H. GAGE. Bleaching skeletons with peroxide of hydrogen.
2. Prof. S. H. GAGE. A holder for demonstrations on whole animals.
3. Dr. GEORGE DIMMOCK. Pure carminic acid for coloring microscopical preparations.
4. Prof. ALPHEUS HYATT. Methods of mounting specimens employed in the Museum of the Geological Survey of Canada.
5. Prof. J. T. ROTHRICK. On the manner of distinguishing good and bad timber by the microscope.
6. Dr. CHARLES S. MINOT. On the classification of tissues and organs with regard to the arrangement of collections.

Profs. Walter and O'Connor, from the Convention of Modern-Language Teachers, were introduced, and, in reply to the resolution sent by the society to the convention, presented the following resolution :—

Resolved, That the Convention of Modern-Language Teachers, now assembled in Columbia College, desires to express its thanks to the Society of Naturalists for its appreciation, and the hope that by the efforts here made greater interest in the scientific study of language, and greater efficiency in its practical study, may be secured.

FRIDAY, DEC. 28, 1883.

AMERICAN MUSEUM OF NATURAL HISTORY.

Afternoon Session.

President Hyatt in the chair. Twenty-two members present. The chair appointed Profs. E. D. Cope, M. E. Wadsworth, W. N. Rice, and Mr. C. D. Walcott, on the committee to define the term professional naturalist, and to coöperate in the revision of the constitution. The chair also appointed Profs. Osborn, Scott, and Sedgwick, and Messrs. Ryder and Kingsley, for the committee to advance the interests of the biological section of the American Association.

The following papers were read :—

1. Dr. GEORGE DIMMOCK. Some typographical materials useful in microscopical work.
2. Prof. B. G. WILDER. The preparation of hollow organs, particularly the brain and heart, by the repeated or continuous injection of alcohol.
3. Profs. B. G. WILDER and S. H. GAGE. The anatomical, histological, and zoölogical uses of *Necturus*.
4. Dr. E. B. WILSON. Methods of section cutting.
5. Prof. A. S. BICKMORE. Methods of instruction employed at the American Museum of Natural History, Central Park, N.Y. [Illustrated by the lantern.]

Prof. Hyatt brought forward the question whether, in view of the very great value of the papers read at this meeting, it is desirable for the society to undertake the publication of any of them. Prof. Scott moved that the matter be referred to the Executive Committee, with power to act. Seconded. In the discussion which followed Prof. Wilder inquired whether the proceedings could not be published in **SCIENCE** or the **AMERICAN NATURALIST**, if necessary, partly at the society's expense. The Secretary called attention to the limited income of the society and the expense of printing. After further discussion the motion was withdrawn.

Prof. Hyatt brought forward the question of having a committee to obtain information in regard to persons available for vacant positions in colleges and elsewhere, where professional naturalists alone are suitable for appointment. This is rendered desirable by the too frequent abuses that occur in appointments of this character. A motion was made and *carried*, that this matter be referred to the Executive Committee to report at a future meeting.

Prof. Heilprin moved that the next meeting of the society be held at Philadelphia. The motion was lost. The society voted to instruct the Secretary to convey the thanks of the society to the authorities of Columbia College and the authorities of the American Museum, for the courteous hospitality they have extended to the society, and to Profs. Newberry and Bickmore for the services they have rendered the society in connection with this meeting.

The society then adjourned.

(Signed,)

CHARLES SEDGWICK MINOT,
Secretary.

R E C O R D S

OF THE

SOCIETY OF NATURALISTS,

E. U. S.

VOLUME I.,

PART SECOND.

— — — —

BOSTON:
PUBLISHED BY THE SECRETARY.
1885.

R E C O R D S .

THE CONSTITUTION,

As it stands after the revision, in accordance with the amendments adopted
at the Washington meeting, December, 1884.

ARTICLE I.

NAME AND OBJECTS.

SECTION I. This association shall be called The Society of Naturalists of the Eastern United States.

SECT. II. The object of this society shall be the association of working naturalists for the discussion of methods of investigation and instruction, laboratory technique and museum administration, and other topics of interest to investigators and teachers of Natural History; and for the adoption of such measures as shall tend to the advancement and diffusion of the knowledge of Natural History in the community.

ARTICLE II.

MEMBERS.

SECTION I. Membership in this society shall be limited to persons professionally engaged in some branch of Natural History as Instructors in Natural History, Officers of Museums, and other Scientific Institutions, Physicians and others. Any member may present to the Executive Committee names of candidates for membership, and those candidates who

are approved by the Executive Committee may be elected to membership by a majority of the members present at any meeting of the society.

SECT. II. Each member shall pay to the Treasurer an annual assessment of two dollars, which shall be considered due at the annual meeting. The name of any member two years in arrears for annual assessments shall be erased from the list of the society; and no such person shall be restored until he has paid his arrearages or has been reelected.

ARTICLE III.

OFFICERS.

SECTION I. The officers of this society shall be a President, three Vice-Presidents, a Secretary, and a Treasurer.

SECT. II. These officers shall be elected by ballot at the annual meeting of the society, and their official term shall commence at the close of the annual meeting.

SECT. III. The same person shall not be eligible as President more than two successive years, nor as Vice-President more than three successive years, and one Vice-President shall retire each year.

SECT. IV. The officers named in Section I shall discharge the duties usually assigned to these respective officers; they, together with two members elected from the society at large, shall constitute the Executive Committee. The Executive Committee shall recommend to the society from time to time such measures as they may deem expedient for the purposes

of the society, besides discharging the specific duties assigned to them by this constitution.

SECT. V. Vacancies in the board of officers, occurring by death, resignation, or otherwise, may be filled by election by ballot at any meeting of the society. A vacancy in the secretaryship or treasurership occurring in the interval of the meetings of the society, may be filled by appointment by the Executive Committee; but the person so appointed shall hold office only until the next meeting of the society.

ARTICLE IV.

MEETINGS.

SECTION I. Meetings of the society may be held in such places as may from time to time be designated by the society; no meetings shall be held without the territory in Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, and the District of Columbia.

SECT. II. The annual meeting shall be held during the week following Christmas, unless otherwise ordered by the Executive Committee.

SECT. III. Special meetings may be appointed at any time by a vote of the society or of the Executive Committee.

ARTICLE V.

QUORUM.

Seven members shall constitute a quorum of the society, and three a quorum of the Executive Committee.

ARTICLE VI.

ACCOUNTS.

A committee shall be appointed at each annual meeting to audit the accounts of the Treasurer for the year closing with that meeting.

ARTICLE VII.

AFFILIATED SOCIETIES.

It shall be the policy of this society, by correspondence and otherwise, to encourage the formation and coöperate in the work of societies of similar name and object in other parts of the country.

ARTICLE VIII.

BY-LAWS.

SECTION I. By-laws recommended by the Executive Committee may be adopted at any meeting by a majority vote.

SECT. II. By-laws may be repealed at any meeting, upon recommendation of the Executive Committee, by a majority vote.

ARTICLE IX.

AMENDMENTS.

Amendments to this constitution, recommended by the Executive Committee may be adopted at any annual meeting by a vote of two-thirds of the members present.

BY-LAWS.

I. A committee of three, to include the Secretary, shall be appointed by the Executive Committee to arrange a programme for each meeting.

II. The following persons shall be considered professionally engaged in natural history within the meaning of Article II., Section 1: — Only those who regularly devote a considerable portion of their time to the advancement of natural history; *first*, those who have published investigations in pure science of acknowledged merit; *second*, teachers of natural history, officers of museums of natural history, physicians, and others who have essentially promoted the natural-history sciences by original contributions of any kind.

III. At the opening of the annual meeting a committee of five shall be appointed to nominate officers for the ensuing year.

LIST OF OFFICERS FOR 1885.

President, G. K. GILBERT.
Vice-Presidents, $\left\{ \begin{array}{l} \text{II. N. MARTIN.} \\ \text{E. D. COPE.} \\ \text{HARRISON ALLEN.} \end{array} \right.$
Secretary, CHARLES SEDGWICK MINOT.
Treasurer, CHARLES A. ASHBURNER.

*Members of the Executive Committee elected from the
Society at Large.*

R. RAMSAY WRIGHT. SAMUEL F. CLARKE.

LIST OF MEMBERS.

[An asterisk designates original membership.]

- *ALLEN, HARRISON, M.D. Comparative Anatomy and Physiology.
117 South 20th street, Philadelphia, Penn.
- *ASHBURNER, CHARLES A., M.S., C.E. Geology.
Geologist in charge, State Second Geological Survey of Pennsylvania.
907 Walnut street, Philadelphia, Penn.
- *BAIRD, SPENCER F., M.D., LL.D. Zoölogy.
Secretary of the Smithsonian Institution; Director of the U.S. National Museum; U.S. Commissioner of Fisheries.
Smithsonian Institution, Washington, D.C.

- ***BEAN, TARLETON H., M.D., M.S.** Ichthyology.
Curator Dep't of Fishes, Editor of Proceedings, National
Museum.
National Museum, Washington, D.C.
- BENEDICT, JAMES E.** Natural History.
Naturalist U.S. Fish Commission, Str. "Albatross."
Smithsonian Institution, Washington, D.C.
- ***BICKMORE, ALBERT S.** Anthropology and Zoölogy.
Superintendent of the American Musuem of Natural History.
American Museum, Central Park, N.Y.
- BOLTON, H. CARRINGTON, A.M., Ph.D.** Mineralogy, Chemistry.
Professor of Chemistry and Mineralogy, Trinity College.
Trinity College, Hartford, Conn.
- ***BOWDITCH, HENRY P., A.M., M.D.** Physiology.
Professor of Physiology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- ***BRITTON, N. L., E.M., Ph.D.** Botany and Geology.
Assistant in Geology and Botany, School of Mines, Columbia
College, and Botanist, Geological Survey of New Jersey.
School of Mines, Columbia College, N.Y.
- BROOKS, W. K., Ph.D.** Animal Morphology.
Assistant Professor of Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- ***BURGESS, EDWARD, A.B.** Entomology.
Secretary of the Boston Society of Natural History, and
Instructor in Entomology at Bussey Institution of Harvard
University.
Boston Society of Natural History, Boston, Mass.
- CALL, R. ELLSWORTH.** Tertiary Palaeontology, Mollusca.
Principal of High School, Moline, Ill.
Moline, Ill.
- ***CLARKE, SAMUEL F., Ph.B., Ph.D.** Zoölogy.
Professor of Natural History, Williams College.
Williamstown, Mass.
- ***COMSTOCK, J. HENRY, B.S.** Entomology.
Professor of Economic Entomology and General Invertebrate
Zoölogy, Cornell University.
Cornell University, Ithaca, N.Y.

- *CONN, HERBERT W., Ph.D. Zoölogy.
Instructor in Biology, Wesleyan University.
Middletown, Conn.
- *COPE, EDWARD D. Palaeontology and Zoölogy.
2100 Pine street, Philadelphia, Penn.
- *COUES, ELLIOTT, A.M., M.D., Ph.D. Vertebrates, Bibliography.
Smithsonian Institution, Washington, D.C.
- *CROSBY, W. O., S.B. Geology.
Assistant Professor of Mineralogy and Lithology, Massachusetts Institute of Technology.
Institute of Technology, Boston, Mass.
- *CUTTING, H. A., A.M., M.D., Ph.D. Geology.
State Geologist and Fish Commissioner of Vermont.
Lunenburgh, Vermont.
- DALL, WILLIAM HEALEY. Mollusca, Palaeontology.
Palaeontologist U.S. Geological Survey, Honorary Curator
of Department of Molluscs, U.S. National Museum.
Smithsonian Institution, Washington, D.C.
- *DANA, JAMES D., Ph.D., LL.D. Mineralogy, Zoölogy, Geology.
Professor of Geology, Yale College.
Yale College, New Haven, Conn.
- *DAVIS, WILLIAM M., S.B., M.E. Geology, Geography and Meteorology.
Assistant Professor of Physical Geography, Harvard College.
Museum of Comparative Zoölogy, Cambridge, Mass.
- *DEWEY, FREDERIC P., Ph.B. Metallurgy.
Curator of Metallurgy, U.S. National Museum.
National Museum, Washington, D.C.
- *DILLER, J. S. Micropetrography and Geology.
Assistant Geologist, U.S. Geological Survey.
U.S. Geological Survey, Washington, D.C.
- *DIMMOCK, GEORGE, Ph.D. Zoölogy.
Cambridge, Mass.
- *DONALDSON, HENRY H., Ph.D. Physiology.
Assistant in Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, M.D.

- ***DUDLEY, WILLIAM R., M.S.** Cryptogamic Botany.
Assistant Professor of Cryptogamic Botany, Cornell University.
Cornell University, Ithaca, N.Y.
- ***DUTTON, C. E.** Geology.
Captain of Ordnance, U.S.A.
U.S. Geological Survey, Washington, D.C.
- ***DWIGHT, WILLIAM B., B.A., M.A., Ph.B.** Palaeontology.
Professor of Natural History and Curator of the Museum,
Vassar College, etc.
Vassar College, Poughkeepsie, N.Y.
- ***EMERSON, B. K., Ph.D.** Geology and Mineralogy.
Professor of Geology, Amherst College.
Amherst, Mass.
- ***EMERTON, JAMES H.** Zoölogy.
Assistant in Zoölogy, Yale College.
Yale College, New Haven, Conn.
- ***EMMONS, S. F.** Geology.
Geologist of the U.S. Geological Survey.
Geological Survey, Washington, D.C.
- ***FARLOW, WM. G., A.B., M.D.** Botany.
Professor of Cryptogamic Botany, Harvard College.
Harvard College, Cambridge, Mass.
- ***FERNALD, C. H., A.M.** Microlepidoptera.
Professor of Natural History, Maine State College.
Orono, Maine.
- ***GAGE, SIMON II., S.B.** Vertebrate Morphology and Physiology.
Assistant Professor of Physiology, and Lecturer on Microscopical Technology, Cornell University.
Cornell University, Ithaca, N.Y.
- GARDINER, EDWARD G., B.S., Ph.D.** Zoölogy.
Assistant in Biology, Massachusetts Institute of Technology.
289 Marlborough street, Boston, Mass.
- ***GERRISH, FREDERICK HENRY, A.M., M.D.** Anatomy.
Professor of Anatomy, Bowdoin College.
675 Congress street, Portland, Me.
- ***GILBERT, G. K.** Geology.
Geologist of the U.S. Geological Survey.
Geological Survey, Washington, D.C.

- ***GILL, THEODORE**, M.D., Ph.D. Ichthyology.
Smithsonian Institution, Washington, D.C.
- ***GOODALE, GEORGE L.**, A.M., M.D. Botany.
 Professor of Botany, Harvard College.
Harvard College, Cambridge, Mass.
- ***GOODE, G. BROWN**, A.M. Zoölogy.
 Assistant Director U.S. National Museum.
National Museum, Washington, D.C.
- GRATACAP, L. P.**, M.A., Ph.B. Mineralogy and Geology.
 Assistant Curator of Geology, American Museum of Natural History, New York.
77th street and 8th avenue, New York, N.Y.
- GRAY, WILLIAM M.**, M.D. Histology,
 Microscopist, Army Medical Museum.
Army Medical Museum, Washington, D.C.
- ***GREENLEAF, R. W.**, A.M., M.D. Botany.
Boston City Hospital, Boston, Mass.
- HAGUE, ARNOLD**. Geology and Petrography.
 Geologist, U.S. Geological Survey.
Geological Survey, Washington, D.C.
- ***HALL, JAMES**, M.S., A.M., M.D., LL.D. Geology, Palæontology.
 State Geologist of New York, Director of the State Museum of Natural History.
State Museum, Albany, N.Y.
- ***HAYDEN, F. V.**, M.D., LL.D. Geology.
 Geologist U.S. Geological Survey.
1803 Arch street, Philadelphia, Penn.
- ***HEILPRIN, ANGELO**. Palæontology and Geology.
 Professor of Invertebrate Palæontology at, and Curator-in-charge of, the Academy of Natural Sciences of Philadelphia, and Professor of Geology at the Wagner Free Institute of Science.
Academy of Natural Sciences, Philadelphia, Penn.
- ***HENSHAW, SAMUEL**. Zoölogy.
 Assistant, Boston Society of Natural History.
Boston Society of Natural History, Boston, Mass.
- ***HITCHCOCK, C. H.**, Ph.D. Geology.
 Professor of Geology and Mineralogy, Dartmouth College.
Hanover, N.H.

- HITCHCOCK, ROMYN. Fresh Water Algæ.
 Acting Curator, U.S. National Museum.
Smithsonian Institution, Washington, D.C.
- *HOLDER, J. B., M.D. Zoölogy.
 Curator of Invertebrate Zoölogy, Am. Museum Nat. History.
American Museum, Central Park, N.Y.
- HOWELL, WILLIAM H., B.A., Ph.D. Physiology.
 Associate in Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- HUNT, T. STERRY, A.M., Ph.D. Geology.
Montreal, Canada.
- *HYATT, ALPIEUS, S.B. Palæontology and Zoölogy.
 Curator of the Boston Society of Natural History, and Professor of Zoölogy and Palæontology at the Massachusetts Institute of Technology.
Boston Society of Natural History, Boston, Mass.
- IDDINGS, JOSEPH P., Ph.B. Geology and Lithology.
 Assistant Geologist, U.S. Geological Survey.
American Museum, Central Park, New York, N.Y.
- JAYNE, HORACE, M.D. Vertebrata.
 Professor of Vertebrate Morphology, University of Pennsylvania.
Biological Department, University of Pennsylvania, Philadelphia, Penn.
- JEFFRIES, J. AMORY, A.B., M.D. Anatomy.
 78 Devonshire street, Boston, Mass.
- *JULIEN, ALEXIS A., Ph.D. Petrography.
 Assistant in Chemistry and Microscopy, School of Mines, Columbia College.
School of Mines, Columbia College, New York, N.Y.
- *KIDDER, J. H., A.M., M.D. Chemistry.
 Chemist U.S. Fish Commission.
Smithsonian Institution, Washington, D.C.
- *KINGSLEY, J. S., D.Sc. Zoölogy.
 Editor of "The Standard Natural History."
Malden, Mass.
- *LEE, LESLIE A., Ph.D. Geology and Biology.
 Professor of Geology and Biology, Bowdoin College.
Brunswick, Maine.

- *LEWIS, H. CARVILL, A.M. Geology and Mineralogy.
 Professor of Mineralogy, Academy of Natural Sciences of
 Philadelphia, and Lecturer on Geology and Palæontology
 at Haverford College, Haverford, Penn.
Academy of Natural Sciences, Philadelphia, Penn.
- *LIBBEY, WILLIAM, Jr., A.M., Sc.D. Histology.
 Professor of Physical Geography, Princeton College, and
 Vice-Director of the E. M. Museum of Geology and
 Archaeology.
Princeton, N.J.
- *LOCKINGTON, W. N. Zoölogy.
1104 Walnut street, Philadelphia, Penn.
- *MACLOSKIE, GEORGE, D.Sc., LL.D. Biology.
 Professor of Biology, Princeton College.
Princeton, N.J.
- *MARCOU, JOHN B. Geology.
 Assistant Geologist, U.S. Geological Survey.
U.S. National Museum, Washington, D.C.
- *MARSHALL, JOHN P., A.M. Mineralogy and Geology.
 Professor of Mineralogy and Geology, Tufts College.
College Hill, Mass.
- *MARTIN, H. NEWELL, A.M., M.D., D.Sc., F.R.S. Physiology.
 Professor of Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- MASON, OTIS T., A.M., Ph.D. Ethnology.
 Curator of the Department of Ethnology, U.S. National
 Museum.
Smithsonian Institution, Washington, D.C.
- *MC GEE, W J. Geology.
 Geologist, U.S. Geological Survey.
U.S. Geological Survey, Washington, D.C.
- McMURRICH, J. PLAYFAIR, M.A., Ph.D. Animal Morphology.
 Instructor in Osteology and Mammalian Anatomy, Johns
 Hopkins University.
Johns Hopkins University, Baltimore, Md.
- *MEEHAN, THOMAS. Botany.
 Botanist to the Pennsylvania State Board of Agriculture,
 Vice-President, Academy of Natural Sciences, Philadel-
 phia.
Germantown, Penn.

- ***MERRIAM, C. HART, M.D.** Vertebrates.
Locust Grove, Lewis Co., N.Y.
- ***MERRILL, GEORGE P., M.S.** Lithology.
 Acting Curator of Lithology and Physical Geology, U.S.
 National Museum.
National Museum, Washington, D.C.
- ***MERRILL, N. F., S.B., Ph.D.** Lithology.
 Professor of Chemistry, University of Vermont.
University of Vermont, Burlington, Vt.
- ***MINOT, CHARLES SEDGWICK, S.B., S.D.** Biology.
 Instructor in Embryology and Histology, Harvard Medical
 School.
Harvard Medical School, Boston, Mass.
- ***MORSE EDWARD S., Ph.D.** Anthropology and Zoölogy.
 Director of the Peabody Academy of Science, Salem, Mass.
Salem, Mass.
- MURDOCH, JOHN, A.M.** Zoölogy and Ethnography.
 Naturalist and Observer, U.S. Signal Service Expedition to
 Point Barrow.
Smithsonian Institution, Washington, D.C.
- ***NEWBERRY, J. S., M.D., LL.D.** Geology.
 Professor of Geology, School of Mines, Columbia College.
School of Mines, Columbia College, New York, N.Y.
- ***NILES, WILLIAM H., A. M., Ph.B.** Physical Geography
 and Historical Geology.
 Professor of Geology and Geography, Massachusetts Insti-
 tute of Technology.
Mass. Institute of Technology, Boston, Mass.
- OLIVER, CHARLES A., A.M., M.D.** Special sense
 Morphology and Physiology.
 Ophthalmic and Aural Surgeon to St. Mary's Hospital, Phila-
 delphia.
1507 Locust street, Philadelphia, Penn.
- ***OSBORN, HENRY F., Sc.D.** Vertebrate Morphology.
 Professor of Comparative Anatomy, Princeton College.
Princeton, N.J.
- ***PACKARD, A. S., Jr., A.M., M.D., Ph.D.** Zoölogy.
 Professor of Zoölogy and Geology, Brown University.
Brown University, Providence, R.I.

- ***PEALE, A. C., A.M., M.D.** Geology.
Geologist, U.S. Geological Survey.
Geological Survey, Washington, D.C.
- ***PECKHAM, GEORGE W., M.D.** Biology.
Teacher of Biology, Milwaukee High School.
Milwaukee, Wisconsin.
- PIERSOL, GEORGE A., M.D.** Histology.
Demonstrator of Normal Histology, Medical Department,
University of Pennsylvania.
University of Pennsylvania, Philadelphia, Penn.
- ***PILLSBURY, J. II.** Biology.
Professor of Biology, Smith College.
Springfield, Mass.
- ***POWELL, J. W., Ph.D., LL.D.** Anthropology and Geology.
Director of the U.S. Geological Survey, and Director of the
Bureau of Ethnology, Smithsonian Institution.
Geological Survey, Washington, D.C.
- ***PRENTISS, A. N., M.S.** Botany.
Professor of Botany, Horticulture, and Arboriculture, Cornell
University.
Cornell University, Ithaca, N.Y.
- ***PRUDDEN, T. MITCHELL, Ph.B., M.D.** Normal and Pathol.
Histology.
Director of the Physiological and Pathological Laboratory of
the Alumni Association of the College of Physicians and
Surgeons, N.Y., and Lecturer on Normal Histology, Yale
Medical School.
114 East 26th street, N.Y.
- ***PUTNAM, FREDERICK W.** Archæology and Ethnology.
Curator of the Peabody Museum of Archæology and Ethnology,
in connection with Harvard University, Permanent Secretary
of the American Association for the Advancement of
Science, and Massachusetts State Commissioner on Inland
Fisheries.
Peabody Museum, Cambridge, Mass.
- RANDOLPH, N. ARCHER, M.D.** Physiology.
Assistant Demonstrator of Physiology, University of Penn-
sylvania.
University of Pennsylvania, Philadelphia, Penn.

- *RATHBUN, RICHARD, M.S. Invertebrates.
Curator, Dep't of Marine Invertebrates, National Museum.
U.S. National Museum, Washington, D.C.
- REICHERT, EDWARD T., M.D. Physiology.
Demonstrator of Physiology, University of Pennsylvania.
University of Pennsylvania, Philadelphia, Penn.
- *RICE, WILLIAM NORTH, Ph.D. Geology.
Professor of Geology, Wesleyan University.
Middletown, Conn.
- *RIDGWAY, ROBERT. Ornithology.
Curator Dep't of Birds, U.S. National Museum.
Smithsonian Institution, Washington, D.C.
- *RILEY, C. V., A.M., Ph.D. Entomology, Mycology.
Entomologist of the U.S. Department of Agriculture, and
Curator of Insects, U.S. National Museum.
1700 13th street, N.W., Washington, D.C.
- *ROBINSON, JOHN. Botany.
Treasurer in charge of Museum of the Peabody Academy of
Science at Salem.
Peabody Academy, Salem, Mass.
- *ROTHROCK, J. T., M.D., B.S. Botany.
Professor of Botany, University of Pennsylvania.
West Chester, Chester Co., Penn.
- *RUSSELL, ISRAEL C. Geology.
U.S. Geological Survey, Washington, D.C.
- *RYDER, JOHN A., A.M., LL.D. Embryology.
Special Assistant in Embryology to the U.S. Fish Commission.
U.S. National Museum, Washington, D.C.
- *SARGENT, CHARLES S. Botany.
Professor of Arboriculture, Harvard University, and Director
of the Arnold Arboretum.
Brookline, Mass.
- *SCOTT, WILLIAM B., Ph.D. Animal Morphology.
Professor of Geology and Palaeontology, Princeton College.
Princeton, N.J.
- *SCUDDER, S. H., A.M., S.B. Entomology and Palaeontology.
Cambridge, Mass.

- ***SEGWICK, WILLIAM T., Ph.D.** Biology.
Assistant Professor of Biology, Massachusetts Institute of Technology.
Massachusetts Institute of Technology, Boston, Mass.
- SEWALL, HENRY, B.Sc., Ph.D.** Physiology.
Professor of Physiology, University of Michigan.
Ann Arbor, Michigan.
- ***SHAKESPEARE, E. O., A.M., M.D.** Histology.
Ophthalmic Surgeon and Pathologist to Philadelphia (Charity) Hospital.
1336 Spruce street, Philadelphia, Penn.
- SHALER, N. S., A.M., S.D.** Palaeontology.
Professor of Palaeontology, Harvard College, and Director of the State Geological Survey of Kentucky.
Cambridge, Mass.
- ***SHARP, BENJAMIN, M.D., Ph.D.** Animal Morphology.
Professor of Invertebrate Zoölogy, Academy of Natural Sciences of Philadelphia.
Academy of Natural Sciences, Philadelphia, Penn.
- ***SHUFELDT, R. W., M.D.** Anatomy of Vertebrates.
Captain, Medical Department, U.S.A.
Care of Smithsonian Institution, Washington, D.C.
- SMITH, ROBERT MEADE, A.M., Ph.D.** Physiology.
Professor of Comparative Physiology, University of Pennsylvania.
332 South Twenty-first street, Philadelphia, Penn.
- SMITH, SANDERSON.** Conchology.
New Brighton, Staten Island, N.Y.
- ***SMITH, SIDNEY I., Ph.B.** Crustacea.
Professor of Comparative Anatomy, Yale College.
Yale College, New Haven, Conn.
- ***STEVENSON, J. J., Ph.D.** Geology.
Professor, University of the City of New York.
University, Washington square, New York, N.Y.
- ***TRUE, FREDERICK W., M.S.**
Librarian and Curator of Mammals, U.S. National Museum.
National Museum, Washington, D.C.

- *TRYON, G. W., Jr. Conchology.
 Conservator of the Conchological Department of the
 Academy of Natural Sciences of Philadelphia.
Academy of Natural Sciences, Philadelphia, Penn.
- *TYLOR, J. M.
 Professor.
Amherst, Mass.
- *VAN VLECK, B. H., S.B. Biology.
 Instructor in Biology and Physiology in Boston University.
Boston Society of Natural History, Boston, Mass.
- *WADSWORTH, M.E., A.M., Ph.D. Mineralogy and Geology.
 Professor of Mineralogy and Geology, Colby University
 Assistant in Lithology, Museum Comparative Zoölogy.
Colby University, Waterville, Maine.
- *WALCOTT, C. D. Palaeontology and Geology.
 Palaeontologist, U.S. Geological Survey, and Hon. Curator
 of Invertebrate Palæozoic Fossils, U.S. National Museum.
National Museum, Washington, D.C.
- WARD, HENRY A., A.M. Natural Science.
 Head of Ward's Natural Science Establishment.
No. 2 College avenue, Rochester, N.Y.
- *WARREN, J. W., A.B., M.D. Physiology.
 Assistant in Physiology, Harvard Medical School.
107 Baylston street, Boston, Mass.
- *WHITE, C. A., A.M., M.D. Invertebrate Palaeontology.
 Curator of Fossil Invertebrates, U.S. National Museum, and
 Palaeontologist, U.S. Geological Survey.
U.S. National Museum, Washington, D.C.
- *WHITFIELD, R. P., M.A. Palaeontology.
 (Late Professor at Troy, N.Y.), Curator of Geology,
 American Museum of Natural History.
*American Museum of Natural History, 77th street and
 8th avenue, New York, N.Y.*
- *WHITMAN, C. O., Ph. D. Animal Morphology.
 Assistant in Zoölogy, Museum Comparative Zoölogy.
Museum of Comparative Zoölogy, Cambridge, Mass.
- *WHITNEY, W. F., M.D. Pathology.
 Curator of the Museum of the Harvard Medical School.
Harvard Medical School, Boston, Mass.

- *WILDER, BURT G., B.S., M.D. Vertebrate Morphology.
Professor of Physiology, Comparative Anatomy, and Zoölogy,
and Curator of Vertebrate Museum, Cornell University.
Cornell University, Ithaca, N.Y.
- WILLIAMS, GEORGE H., A.B., Ph.D. Mineralogy.
Associate Professor of Mineralogy and Petrography, Johns
Hopkins University.
Johns Hopkins University, Baltimore.
- *WILLIAMS, HENRY S., Ph.D. Palæontology.
Professor of Palæontology, Cornell University, and Assistant
Geologist, U. S. Geological Survey.
Cornell University, Ithaca, N.Y.
- *WILLIAMS, S. G., A.M., Ph.D. Economic Geology.
Professor of Geology, Cornell University.
Cornell University, Ithaca, N.Y.
- *WILSON, EDMUND B., Ph.B., Ph.D. Animal Morphology.
Lecturer on Biology, Williams College.
Williamstown, Mass.
- *WORTMAN, J. L. Vertebrate Palæontology and Zoölogy.
Anatomist to the U.S. Army Medical Museum.
Army Medical Museum, Washington, D.C.
- *WRIGHT, G. FREDERICK, Rev. Geology.
Oberlin, Ohio.
- WRIGHT, R. RAMSAY. M.A., B.Sc. Zoölogy.
Professor of Natural History, University College, Toronto,
Canada.
University College, Toronto, Canada.
- *YARROW, H.C., M.D., Acting Asst.-Surg. U.S.A. Herpetology.
Curator of Herpetology, U.S. National Museum.
National Museum, Washington, D.C.

THIRD MEETING, AT WASHINGTON, D.C.**FIRST DAY, DECEMBER 29, 1884.****LECTURE ROOM, U.S. NATIONAL MUSEUM.***Morning Session.*

President Hyatt in the Chair. Thirty-two members present.

The following was read : —

REPORT OF THE SECRETARY.

At the last meeting of the Society, in New York, in December, 1883, fourteen new members were elected, making a total of one hundred and twenty-five. Two members have offered their resignations, and one resignation has been accepted, making the total membership stand at one hundred and twenty-four.

At the same meeting the attendance was large. Both the very great interest expressed in the eighteen papers, and the activity of the discussions, augur very well for the future of the Society, and confirm the wisdom of the limitations which it has placed upon itself. During the past year the adoption of By-Law ii., defining the meaning of the term "professional naturalist," has accentuated the policy of the Society in regard to the standard of its membership, and, it is hoped, will steadily contribute to elevate the pursuit of Natural History in America.

To better fulfil certain purposes of the Society it seems desirable to establish a bureau of information. A plan for accomplishing this will be announced later during the present meeting.

In accordance with a vote of the Executive Committee, your Secretary has published Part I. of the "Records," containing the constitution, a list of members, and the records proper. The list of members, if it meet with the approval of members, will be continued annually, — as it is an authentic statement of data, which are considered important and desirable to have recorded and known. The "Records" have been sent to all the members and to a few other persons and institutions.

In conclusion, the Secretary can only congratulate the Society upon its past prosperity and present prospects.

Respectfully submitted by

CHARLES SEDGWICK MINOT.

The Secretary announced that the Executive Committee recommended the following amendments to the constitution, as follows: to amend Art. viii., so as to read:—

Art. viii., Sect. i. By-Laws recommended by the Executive Committee may be adopted at any meeting by a majority vote.

Sect. ii. By-Laws may be repealed at any meeting, upon recommendation of the Executive Committee, by a majority vote.

It was moved and *carried* that this amendment be adopted.

It was announced by the Secretary that the Executive Committee recommended the adoption of the following:—

By-Law iii. At the opening of the annual meeting a committee of five shall be appointed to nominate officers for the ensuing year.

By a vote of the Society this By-Law was adopted.

It was moved and *carried* that the Chair appoint this committee. The Chair appointed the following persons the Nominating Committee: Profs. Goode, Osborn, Gage, Niles, and Lewis.

After some discussion it was moved and *carried* that the Executive Committee be directed to consider the desirability of founding a bureau of information concerning vacant posts in the Natural History Departments of Educational and other institutions.

The following new members were elected: W. K. Brooks, Edward G. Gardiner, William H. Howell, T. Sterry Hunt, N. S. Shaler; R. Ramsay Wright.

The following papers were read:—

1. Dr. CHARLES S. MINOT. A new cabinet for microscopical specimens.
2. ——. A new feeding-trough for grain.
3. ——. An apparatus for calculating intervals of days rapidly.
4. Prof. SIMON H. GAGE. On the use of Müller's Fluid for the preservation of the natural colors of animals.
5. ——. On the use of collodion for the preservation of rubber rings and stoppers, etc.
6. ——. Glass-bulb canulae for the injection of silver nitrate, etc.

7. Prof. HENRY F. OSBORN. A simple method of injecting the entire arterial and venous systems in different colors.
8. Prof. R. RAMSAY WRIGHT. On certain methods of staining.
9. Dr. CHARLES S. MINOT. On a new staining solution for histological use.
10. Mr. CHARLES A. ASHBURNER. Notes on barometric hypsometry.

MONDAY, DEC. 29, 1884.

UNITED STATES NATIONAL MUSEUM.

Afternoon Session.

President Hyatt in the chair. Thirty-four members present.

After a somewhat prolonged discussion concerning the future publications of the Society, Dr. Gill moved to refer the whole question to the Executive Committee. Seconded and *carried*.

The following new members were elected: William Healey Dall, J. Playfair McMurrich, and Henry Sewall.

The following papers were read:—

1. Prof. H. C. LEWIS. A summer school of geology.
2. Mr. CHARLES A. ASHBURNER. Methods in practical geology.
3. Prof. H. N. MARTIN. The use of modelling clay to illustrate lectures.
4. Prof. HENRY F. OSBORN. Methods of investigating the embryology of the opossum.
5. Dr. THEODORE GILL. On osteological collections.

THIRD MEETING, AT WASHINGTON, D.C.

SECOND DAY, DEC. 30, 1884.

LECTURE-ROOM, U S. NATIONAL MUSEUM.

Morning Session.

President Hyatt in the chair. Thirty-nine members present.

There was presented the following

REPORT OF THE TREASURER.

PRINCETON, Dec. 26, 1884.

Not having at hand the figures giving the exact balance at the time of the last report to the Society, a statement of the entire receipts and expenditures is given in this report:—

Received from subscriptions	\$204 00
Paid out—	
1883.	
April 19. Springfield Union Co., for printing,	\$1 71
Oct. 25. James T. Robinson & Son, for printing	10 25
Dec. 28. Secretary, for expenses	18 13
1884.	
Jan. 3. W. H. Wheeler, for printing	12 50
President, expenses	7 79
Sept. 23. Secretary, printing records, etc.	86 06
Postage, and P. O. orders	1 25
Total	<u>137 69</u>
Leaving balance	\$66 31

W. B. SCOTT,
Treasurer.

There was presented the following

REPORT OF THE AUDITORS.

PRINCETON, Dec. 20, 1884.

We have examined the accounts of the Treasurer of the Society of Naturalists of the Eastern United States,—extending from April, 1883, to Dec., 1884, and the vouchers and bank account, and find them correct. No vouchers for expenses and payments through the Secretary. The balance to the Society's credit at this date is sixty-six dollars and thirty-one cents (\$66³¹₁₀₀).

GEORGE MACLOSKIE,
HENRY F. OSBORN,
Auditors.

There was presented the following

REPORT OF THE COMMITTEE TO ADVANCE THE INTERESTS
OF THE BIOLOGICAL SECTION OF THE AMERICAN ASSO-
CIATION FOR THE ADVANCEMENT OF SCIENCE.

This committee was appointed in the belief that the members of the *Society of Naturalists* can, by coöperation, lend valuable aid to the Section of Biology of the American Association. In general, the committee have reached the conclusion that there are several measures which, if put forward and carried into effect, will increase the efficiency, raise the standard, and widen the interest in the work of the above Section. At present there is little opportunity offered for the introduction or discussion of any reform measures in the crowded sessions of the Section, although we are fully confident that the general sentiment among the members is in sympathy with any changes that will tend to place the proceedings of the Section on a higher plane.

The work of the committee during the past year has been mainly in the line of correspondence and consultation upon such measures as can be most advantageously proposed at the next meeting of the Association. Previous to the Philadelphia meeting, in September, Professor Cope kindly adopted a suggestion by the committee, and, as president of the Biological Section, sent a special invitation to the biologists of the British Association, inviting them to take part in the Philadelphia meeting.

The committee have finally agreed upon the following suggestions, which, if they meet with the approval of this Society, may, we hope, be carried into effect during the coming year : —

1. The proposal, by the vice-president, of two or three questions relating to Biology, of especial current interest, to be brought before the Section for discussion ; these questions to be communicated to members in advance, through the usual bulletins of the Association. This step has already been taken in two other Sections of the Association, and has shown very good results.

2. At the direction of the vice-president, a number of invitations should be sent to English and other foreign biologists to take part in the work of the Section, or send abstracts of recent dis-

coveries or researches. The measure was taken by Professor Ray Lankester, president of the Section of Biology of the English Association, two years ago, and a number of papers were sent over from this country, and well received on the other side.

3. In regard to the admission of papers, the Sectional Committee should carefully observe the requirements as to the preliminary abstracts being full enough to give some idea of the quality of the paper, and further the Sectional Committee should decide as to which papers should be printed in the Proceedings of the Association. Brief notes of the discussion following papers should in some cases be published.

4. The Sectional Committee should, to a certain extent, classify the papers relating to different branches of Biology and to laboratory technique, into groups, so as, in a measure, to bring the reading of papers of the same character together.

Finally, the following questions arise: Whether the above changes are desirable, and how it is best to introduce them? As to the latter, there would seem to be one course which is least open to criticism, namely, that they should be introduced into the Association, not as coming directly from the Society, but by ourselves, as members of the American Association. This may be carried out in the following way: —

1. These measures may be communicated to the next President of the Biological Section, with the request that, if he concurs, he will execute part of them, acting upon his own responsibility.

2. These measures may be brought forward for open discussion in the Section, upon motion that a committee be regularly appointed to consider them and present a report to the Section.

The committee feel that they have by no means exhausted this question, and will therefore be glad to receive suggestions from any member of this Society.

The action proposed above is open to the objection that it gives this Society the appearance of a preliminary caucus, seeking to obtain undue control in the larger Society. It can be said in reply that the same objection holds good against any previously concerted action which has in view the welfare of the Association. It is, however, with a view to avoid such criticism that

the committee have proposed that these and other similar measures should be carried directly into the Association, to be brought forward and discussed there.

Respectfully submitted,

J. S. KINGSLEY.

JOHN A. RYDER.

WM. B. SCOTT.

W. T. SEDGWICK.

HENRY F. OSBORN,

Chairman.

WASHINGTON, Dec. 30, 1884.

The Secretary announced that the Executive Committee recommended the following amendment to the constitution for adoption, viz.: to amend Art. iii. to read:—

ARTICLE III.—OFFICERS.

SECTION I. The officers of this Society shall be a President, three Vice-Presidents, a Secretary, and a Treasurer.

SECT. II. Unchanged.

SECT. III. The same person shall not be eligible as President more than two successive years, nor as Vice-President more than three successive years, and one Vice-President shall retire each year.

SECT. IV. The officers named in Section I shall discharge the duties usually assigned to these respective officers; they, together with two members elected from the Society at large, shall constitute the Executive Committee. The Executive Committee shall recommend to the Society, from time to time, such measures as they may deem expedient for the purposes of the Society, besides discharging the specific duties assigned to them by this constitution.

SECT. V. Unchanged.

This amendment was adopted by the necessary vote of the Society.

The Nominating Committee reported the following nominations for officers for the ensuing year:—

President. — G. K. GILBERT, of Washington.

Vice-Presidents. — H. N. MARTIN, of Baltimore.

E. D. COPE, of Philadelphia.

HARRISON ALLEN, of Philadelphia.

Secretary. — C. S. MINOT, of Boston.

Treasurer. — CHARLES A. ASHBURNER, of Philadelphia.

Members-at-large of Executive Committee. — R. RAMSAY WRIGHT, of Toronto; SAMUEL F. CLARKE, of Williamstown.

It was moved and *carried* that the Secretary be directed to cast an affirmative ballot for the officers nominated by the committee. The ballot was cast and the above enumerated nominees were declared duly elected.

The following new members were elected: R. Ellsworth Call, Romyn Hitchcock, Horace Jayne, John Murdoch, and Charles A. Oliver.

The following papers were read:—

1. C. D. WALCOTT. The collecting and working of invertebrate palæontologic material.
2. G. K. GILBERT. Geological bibliography.
3. GEORGE P. MERRILL. Exhibition of a colored enlarged photo-micrograph of a thin section of a rock.
4. G. BROWN GOODE. Account of the cases used in the U. S. National Museum.
5. J. A. RYDER. On museum alcoholics.
6. B. G. WILDER and S. H. GAGE. An investigator's table with double or treble revolving top and movable book-rests.
7. R. RAMSAY WRIGHT. On the use of series of sections in laboratory teaching, and a convenient way of obtaining them.

TUESDAY, DEC. 30, 1884.

LECTURE-ROOM, U. S. NATIONAL MUSEUM.

Afternoon Session.

President Hyatt in the chair. Twenty-nine members present.

The President announced that a communication of an informal character had been received from Prof. Baird, having reference

to the publication of the "Records" of the Society through the Smithsonian Institution.

Dr. Theodore Gill moved to refer the matter to the Executive Committee; — seconded. Dr. C. S. Minot moved to amend by adding a request that the Executive Committee convey the thanks of the Society to Prof. Baird. The amendment was accepted. The amended motion was put and *carried*.

O. T. Mason was elected a member of the Society.

The following papers were read: —

1. Dr. H. A. HOWELL. On the use of Terrapin blood for the demonstration of the phenomena of coagulation.
2. Dr. HARRISON ALLEN. Exhibition of the palatograph.
3. Dr. C. V. RILEY. On the mounting of alcoholic specimens in insect cabinets.
4. — — —. On a preserving fluid for soft galls and plant tissues.
5. Mr. JOHN MURDOCK. New application of the towing-net in Arctic regions.
6. Mr. F. W. TRUE. On the preservation of type specimens.
7. Mr. G. BROWN GOODE. Exhibition of a large diagram made by photography.
8. Prof. WILLIAM H. NILES. Shall we define groups of organisms?
9. Prof. L. F. WARD. On a method of rapid drawing for photo-engraving.
10. Mr. R. E. CALL. Dentition of certain molluscs.

Prof. Niles moved that the thanks of the Society be conveyed to the authorities of the Smithsonian Institution and of the National Museum for the courtesy and hospitality shown to the Society during this meeting. The motion was appropriately seconded by Prof. Gage, and *carried* by a unanimous vote.

The Society then adjourned.

(Signed), CHARLES SEDGWICK MINOT,
Secretary.



RECORDS
OF THE
AMERICAN SOCIETY
OF
NATURALISTS.

(FORMERLY SOCIETY OF NATURALISTS OF THE
EASTERN UNITED STATES.)

VOLUME I.,
PART THIRD.

BOSTON :
PUBLISHED BY THE SECRETARY.
1886.



R E C O R D S .



THE CONSTITUTION,

As it stands after the revision, in accordance with the amendments adopted
at the Boston meeting, December, 1885.

ARTICLE I.

NAME AND OBJECTS.

SECTION I. This association shall be called the American Society of Naturalists.

SECT. II. The object of this society shall be the association of working naturalists for the discussion of methods of investigation and instruction, laboratory technique and museum administration, and other topics of interest to investigators and teachers of Natural History; and for the adoption of such measures as shall tend to the advancement and diffusion of the knowledge of Natural History in the community.

ARTICLE II.

MEMBERS.

SECTION I. Membership in this society shall be limited to persons professionally engaged in some branch of Natural History as Instructors in Natural History, Officers of Museums, and other Scientific Institutions, Physicians and others. Any member may present to the Executive Committee names of candidates for membership, and those candidates who

are approved by the Executive Committee may be elected to membership by a majority of the members present at any meeting of the society.

SECT. II. Each member shall pay to the Treasurer an annual assessment of two dollars, which shall be considered due at the annual meeting. The name of any member two years in arrears for annual assessments shall be erased from the list of the society; and no such person shall be restored until he has paid his arrearages or has been reelected.

SECT. III. Honorary members, exempt from the payment of dues, may be elected upon recommendation of the Executive Committee, by a two-thirds vote of the members present at any meeting of the Society. The number of honorary members is limited to five.

ARTICLE III.

OFFICERS.

SECTION I. The officers of this society shall be a President, three Vice-Presidents, a Secretary, and a Treasurer.

SECT. II. These officers shall be elected by ballot at the annual meeting of the society, and their official term shall commence at the close of the annual meeting.

SECT. III. The same person shall not be eligible as President more than two successive years, nor as Vice-President more than three successive years, and one Vice-President shall retire each year.

SECT. IV. The officers named in Section I shall discharge the duties usually assigned to these respec-

tive officers; they, together with two members elected from the society at large, shall constitute the Executive Committee. The Executive Committee shall recommend to the society from time to time such measures as they may deem expedient for the purposes of the society, besides discharging the specific duties assigned to them by this constitution.

SECT. V. Vacancies in the board of officers, occurring by death, resignation, or otherwise, may be filled by election by ballot at any meeting of the society. A vacancy in the secretaryship or treasurership occurring in the interval of the meetings of the society, may be filled by appointment by the Executive Committee; but the person so appointed shall hold office only until the next meeting of the society.

ARTICLE IV.

MEETINGS.

SECTION I. Meetings of the society may be held in such places as may from time to time be designated by the society; no meetings shall be held without the territory in Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, and the District of Columbia.

SECT. II. The annual meeting shall be held during the week following Christmas, unless otherwise ordered by the Executive Committee.

SECT. III. Special meetings may be appointed at any time by a vote of the society or of the Executive Committee.

ARTICLE V.**QUORUM.**

Seven members shall constitute a quorum of the society, and three a quorum of the Executive Committee.

ARTICLE VI.**ACCOUNTS.**

A committee shall be appointed at each annual meeting to audit the accounts of the treasurer for the year closing with that meeting.

ARTICLE VII.**AFFILIATED SOCIETIES.**

It shall be the policy of this society, by correspondence and otherwise, to encourage the formation and coöperate in the work of societies of similar name and object in other parts of the country.

ARTICLE VIII.**BY-LAWS.**

SECTION I. By-Laws recommended by the Executive Committee may be adopted at any meeting by a majority vote.

SECT. II. By-laws may be repealed at any meeting, upon recommendation of the Executive Committee, by a majority vote.

ARTICLE IX.

AMENDMENTS.

Amendments to this constitution, recommended by the Executive Committee, may be adopted at any annual meeting by a vote of two-thirds of the members present.

BY-LAWS.

- I. A committee of three, to include the Secretary, shall be appointed by the Executive Committee to arrange a programme for each meeting.
- II. The following persons shall be considered professionally engaged in natural history within the meaning of Article II., Section 1:— Only those who regularly devote a considerable portion of their time to the advancement of natural history; *first*, those who have published investigations in pure science of acknowledged merit; *second*, teachers of natural history, officers of museums of natural history, physicians, and others who have essentially promoted the natural-history sciences by original contributions of any kind.
- III. At the opening of the annual meeting a committee of five shall be appointed to nominate officers for the ensuing year.

LIST OF OFFICERS FOR 1886.

President, G. K. GILBERT.

Vice-Presidents, { E. D. COPE,
HARRISON ALLEN,
GEORGE L. GOODALE.

Secretary, SAMUEL F. CLARKE.

Treasurer, CHARLES A. ASHBURNER.

*Members of the Executive Committee Elected from the
Society at Large.*

R. RAMSAY WRIGHT,

CHARLES SEDGWICK MINOT.

LIST OF HONORARY MEMBERS.

- *BAIRD, SPENCER F., M.D., LL.D. Zoölogy.
Secretary of the Smithsonian Institution; Director of the
U.S. National Museum; U.S. Commissioner of Fisheries.
Smithsonian Institution, Washington, D.C.
- *DANA, JAMES D., Ph.D., LL.D. Mineralogy, Zoölogy, Geology.
Professor of Geology, Yale College.
Yale College, New Haven, Conn.
- GRAY, ASA, A.M., M.D., LL.D. Botany.
Fisher Professor of Natural History and Director of the
Herbarium, Harvard College.
Cambridge, Mass.

LIST OF MEMBERS.

[An asterisk designates original membership.]

- ***ALLEN, HARRISON, M.D.** Comparative Anatomy and Physiology.
117 South 20th street, Philadelphia, Penn.
- ***ASHBURNER, CHARLES A., M.S., C.E.** Geology.
Geologist in Charge Second State Geological Survey of Pennsylvania.
907 Walnut street, Philadelphia, Penn.
- ***BARROWS, WALTER B., B.S.** Ornithology.
Curator of the Museum of Wesleyan University.
Middletown, Conn.
- ***BEAN, TARLETON H., M.D., M.S.** Ichthyology.
Curator Dep't of Fishes, Editor of Proceedings, National Museum.
National Museum, Washington, D.C.
- BENEDICT, JAMES E.** Natural History.
Naturalist U.S. Fish Commission, Str. "Albatross."
Smithsonian Institution, Washington, D.C.
- ***BICKMORE, ALBERT S.** Anthropology and Zoölogy.
Superintendent of the American Museum of Natural History.
American Museum, Central Park, N.Y.
- BOLTON, H. CARRINGTON, A.M., Ph.D.** Mineralogy, Chemistry.
Professor of Chemistry and Mineralogy, Trinity College.
Trinity College, Hartford, Conn.
- ***BOWDITCH, HENRY P., A.M., M.D.** Physiology.
Professor of Physiology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- ***BRITTON, N. L., E.M., Ph.D.** Botany and Geology.
Assistant in Geology and Botany, School of Mines, Columbia College, and Botanist, Geological Survey of New Jersey.
School of Mines, Columbia College, N.Y.

- BROOKS, W. K., Ph.D.** Animal Morphology.
 Assistant Professor of Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- ***BURGESS, EDWARD, A.B.** Entomology.
 Secretary of the Boston Society of Natural History, and
 Instructor in Entomology at Bussey Institution of Harvard
 University.
Boston Society of Natural History, Boston, Mass.
- CALL, R. ELLSWORTH.** Tertiary Palæontology, Mollusca.
 Assistant Professor in Geology and Zoölogy, University of
 Missouri.
Columbia, Missouri.
- ***CLARKE, SAMUEL F., Ph.B., Ph.D.** Zoölogy.
 Professor of Natural History, Williams College.
Williamstown, Mass.
- ***COMSTOCK, J. HENRY, B.S.** Entomology.
 Professor of Economic Entomology and General Invertebrate
 Zoölogy, Cornell University.
Cornell University, Ithaca, N.Y.
- ***CONN, HERBERT W., Ph.D.** Zoölogy.
 Associate Professor in Biology, Wesleyan University.
Middletown, Conn.
- ***COPE, EDWARD D.** Palæontology and Zoölogy.
2100 Pine street, Philadelphia, Penn.
- ***COUES, ELLIOTT, A.M., M.D., Ph.D.** Vertebrates, Bibliog-
 raphy.
Smithsonian Institution, Washington, D.C.
- ***CROSBY, W. O., S.B.** Geology.
 Assistant Professor of Mineralogy and Lithology, Massachu-
 setts Institute of Technology.
Institute of Technology, Boston, Mass.
- ***CUTTING, H. A., A.M., M.D., Ph.D.** Geology.
 State Geologist and Fish Commissioner of Vermont.
Lunenburgh, Vermont.
- DALL, WILLIAM HEALEY.** Mollusca, Palæontology.
 Palæontologist U.S. Geological Survey, Honorary Curator
 of Department of Molluscs, U.S. National Museum.
Smithsonian Institution, Washington, D.C.

- ***DAVIS, WILLIAM M., S.B., M.E.** Geology, Geography, and Meteorology.
Assistant Professor of Physical Geography, Harvard College.
Museum of Comparative Zoölogy, Cambridge, Mass.
- ***DEWEY, FREDERIC P., Ph.B.** Metallurgy.
Curator of Metallurgy, U.S. National Museum.
National Museum, Washington, D.C.
- ***DILLER, J. S.** Micropetrography and Geology.
Assistant Geologist, U.S. Geological Survey.
U.S. Geological Survey, Washington, D.C.
- ***DIMMOCK, GEORGE, Ph.D.** Zoölogy.
Cambridge, Mass.
- ***DONALDSON, HENRY H., Ph.D.** Physiology.
Assistant in Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, M.D.
- ***DUDLEY, WILLIAM R., M.S.** Cryptogamic Botany.
Assistant Professor of Cryptogamic Botany, Cornell University.
Cornell University, Ithaca, N.Y.
- ***DUTTON, C. E.** Geology.
Captain of Ordnance, U.S.A.
U.S. Geological Survey, Washington, D.C.
- ***DWIGHT, WILLIAM B., B.A., M.A., Ph.B.** Palæontology.
Professor of Zoölogy and Curator of the Museum, Vassar College, etc.
Vassar College, Poughkeepsie, N.Y.
- ***DWIGHT, THOMAS, A.M., M.D.** Anatomy.
Parkman Professor of Anatomy, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- ***EMERSON, B. K., Ph.D.** Geology and Mineralogy.
Professor of Geology, Amherst College.
Amherst, Mass.
- ***EMERTON, JAMES H.** Zoölogy.
Assistant in Zoölogy, Yale College.
Yale College, New Haven, Conn.
- ***EMMONS, S. F.** Geology.
Geologist of the U.S. Geological Survey.
Geological Survey, Washington, D.C.

- *ERNST, HAROLD C., A.M., M.D. Bacteriology.
Demonstrator of Bacteriology, Harvard Medical School.
Harvard Medical School, Boston, Mass.

*FARLOW, WM. G., A.B., M.D. Botany.
Professor of Cryptogamic Botany, Harvard College.
Harvard College, Cambridge, Mass.

*FERNALD, C. H., A.M. Microlepidoptera.
Professor of Natural History, Maine State College.
Orono, Maine.

*GAGE, SIMON H., S.B. Vertebrate Morphology and Physiology.
Assistant Professor of Physiology, and Lecturer on Microscopical Technology, Cornell University.
Cornell University, Ithaca, N.Y.

*GARDINER, EDWARD G., B.S., Ph.D. Zoölogy.
Assistant in Biology, Massachusetts Institute of Technology.
289 Marlborough street, Boston, Mass.

*GERRISH, FREDERICK HENRY, A.M., M.D. Anatomy.
Professor of Anatomy, Bowdoin College.
675 Congress street, Portland, Me.

*GILBERT, G. K. Geology.
Geologist of the U.S. Geological Survey.
Geological Survey, Washington, D.C.

*GILL, THEODORE, M.D., Ph.D. Ichthyology.
Smithsonian Institution, Washington, D.C.

*GOODALE, GEORGE L., A.M., M.D. Botany.
Professor of Botany, Harvard College.
Harvard College, Cambridge, Mass.

*GOODE, G. BROWN, A.M. Zoölogy.
Assistant Director U.S. National Museum.
National Museum, Washington, D.C.

GRATACAP, L. P., M.A., Ph.B. Mineralogy and Geology.
Assistant Curator of Geology, American Museum of Natural History, New York.
77th street and 8th avenue, New York, N.Y.

GRAY, WILLIAM M., M.D. Histology.
Microscopist, Army Medical Museum.
Army Medical Museum, Washington, D.C.

*GREENLEAF, R. W., A.M., M.D. Botany.
Boston City Hospital, Boston, Mass.

- HAGUE, ARNOLD. Geology and Petrography.
Geologist, U.S. Geological Survey.
Geological Survey, Washington, D.C.
- *HALL, JAMES, M.S., A.M., M.D., LL.D. Geology, Palæontology.
State Geologist of New York, Director of the State Museum
of Natural History.
State Museum, Albany, N.Y.
- *HAYDEN, F. V., M.D., LL.D. Geology.
Geologist, U.S. Geological Survey.
1803 Arch street, Philadelphia, Penn.
- *HEILPRIN, ANGELO. Palæontology and Geology.
Professor of Invertebrate Palæontology at, and Curator-in-
charge of, the Academy of Natural Sciences of Phila-
delphia, and Professor of Geology at the Wagner Free
Institute of Science.
Academy of Natural Sciences, Philadelphia, Penn.
- *HENSHAW, SAMUEL. Zoölogy.
Assistant, Boston Society of Natural History.
Boston Society of Natural History, Boston, Mass.
- *HITCHCOCK, C. H., Ph.D. Geology.
Professor of Geology and Mineralogy, Dartmouth College.
Hanover, N.H.
- HITCHCOCK, ROMYN. Fresh Water Algæ.
Acting Curator, U.S. National Museum.
Smithsonian Institution, Washington, D.C.
- *HOLDER, J. B., M.D. Zoölogy.
Curator of Invertebrate Zoölogy, Am. Museum Nat. History.
American Museum, Central Park, N.Y.
- HOWELL, WILLIAM H., B.A., Ph.D. Physiology.
Associate in Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, M.D.
- HUNT, T. STERRY, A.M., LL.D. Mineralogy and Geology.
Montreal, Canada.
- *HYATT, ALPHEUS, S.B. Palæontology and Zoölogy.
Curator of the Boston Society of Natural History, and Pro-
fessor of Zoölogy and Palæontology at the Massachusetts
Institute of Technology.
Boston Society of Natural History, Boston, Mass.

- IDDINGS, JOSEPH P., Ph.B.** Geology and Lithology.
 Assistant Geologist, U.S. Geological Survey.
American Museum, Central Park, New York, N.Y.
- JAYNE, HORACE, M.D.** Vertebrata.
 Professor of Vertebrate Morphology, University of Pennsylvania.
Biological Department, University of Pennsylvania, Philadelphia, Penn.
- JEFFRIES, J. AMORY, A.B., M.D.** Anatomy.
78 Devonshire street, Boston, Mass.
- *JULIEN, ALEXIS A., Ph.D.** Petrography.
 Assistant in Chemistry and Microscopy, School of Mines,
 Columbia College.
School of Mines, Columbia College, New York, N.Y.
- *KIDDER, J. H., A.M., M.D.** Chemist.
 Chemist U.S. Fish Commission.
Smithsonian Institution, Washington, D.C.
- *KINGSLEY, J. S., D.Sc.** Zoölogy.
 Editor of the "Standard Natural History."
Malden, Mass.
- *LEE, LESLIE A., Ph.D.** Geology and Biology.
 Professor of Geology and Biology, Bowdoin College.
Brunswick, Maine.
- *LEWIS, H. CARVILL, A.M.** Geology and Mineralogy.
 Professor of Mineralogy, Academy of Natural Sciences of
 Philadelphia, and Lecturer on Geology and Palaeontology
 at Haverford College, Haverford, Penn.
Academy of Natural Sciences, Philadelphia, Penn.
- *LIBBEY, WILLIAM, Jr., A.M., Sc.D.** Histology.
 Professor of Physical Geography, Princeton College, and
 Vice-Director of the E. M. Museum of Geology and
 Archæology.
Princeton, N.J.
- *LOCKINGTON, W. N.** Zoölogy.
1104 Walnut street, Philadelphia, Penn.

- *MACLOSKEIE, GEORGE, D.Sc., LL.D. Biology
 Professor of Biology, Princeton College.
Princeton, N.J.

*MARCOU, JOHN B. Geology.
 Assistant Geologist, U.S. Geological Survey.
U.S. National Museum, Washington, D.C.

*MARSHALL, JOHN P., A.M. Mineralogy and Geology.
 Professor of Mineralogy and Geology, Tufts College.
College Hill, Mass.

*MARTIN, H. NEWELL, A.M., M.D., D.Sc., F.R.S. Physiology.
 Professor of Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.

MASON, OTIS T., A.M., Ph.D. Ethnology.
 Curator of the Department of Ethnology, U.S. National
 Museum.
Smithsonian Institution, Washington, D.C.

*McGEE, W. J. Geology.
 Geologist, U.S. Geological Survey.
U.S. Geological Survey, Washington, D.C.

McMURRICH, J. PLAYFAIR, M.A., Ph.D. Animal Morphology.
 Late Instructor in Osteology and Mammalian Anatomy,
 Johns Hopkins University. Professor of Biology, Haver-
 ford College.
Haverford, Penn.

*MEEHAN, THOMAS. :
 Botanist to the Pennsylvania State Board of Agriculture,
 Vice-President, Academy of Natural Sciences, Philadel-
 phia.
Germantown, Penn.

*MERRIAM, C. HART, M.D. Mammals and Birds.
 Chief of Division of Economic Ornithology and Mammalogy
 of the U.S. Department of Agriculture, Secretary of the
 American Ornithologists' Union, and Chairman of its
 Committee on the Migration and Geographical Distribu-
 tion of North American Birds.
Washington, D.C.

- MERRILL, F. J. H., Ph.B.** Geology.
 Assistant Geologist, Geological Survey of New Jersey.
126 E. 60th street, New York, N.Y.
- ***MERRILL, GEORGE P., M.S.** Lithology.
 Acting Curator of Lithology and Physical Geology, U.S.
 National Museum.
National Museum, Washington, D.C.
- ***MERRILL, N. F., S.B., Ph.D.** Lithology.
 Professor of Chemistry, University of Vermont.
University of Vermont, Burlington, Vt.
- ***MINOT, CHARLES SEDGWICK, S.B., S.D.** Biology.
 Instructor in Embryology and Histology, Harvard Medical
 School.
Harvard Medical School, Boston, Mass.
- MIXTER, SAMUEL J., B.S., M.D.** Anatomy.
 Assistant Demonstrator of Anatomy, Harvard Medical
 School.
Harvard Medical School, Boston, Mass.
- ***MORSE, EDWARD S., Ph.D.** Anthropology and Zoölogy.
 Director of the Peabody Academy of Science, Salem, Mass.
Salem, Mass.
- MURDOCH, JOHN, A.M.** Zoölogy and Ethnography.
 Naturalist and Observer, U.S. Signal Service Expedition to
 Point Barrow.
Smithsonian Institution, Washington, D.C.
- ***NEWBERRY, J. S., M.D., LL.D.** Geology.
 Professor of Geology, School of Mines, Columbia College.
School of Mines, Columbia College, New York, N.Y.
- ***NILES, WILLIAM H., A.M., Ph.B.** Physical Geography
 and Historical Geology.
 Professor of Geology and Geography, Massachusetts Insti-
 tute of Technology.
Mass. Institute of Technology, Boston, Mass.
- OLIVER, CHARLES A., A.M., M.D.** Special sense Morphology
 and Physiology.
 Ophthalmic and Aural Surgeon to St. Mary's Hospital, Phila-
 delphia.
1507 Locust street, Philadelphia, Penn.

- ***OSBORN, HENRY F., Sc.D.** Vertebrate Morphology.
Professor of Comparative Anatomy, Princeton College.
Princeton, N.J.
- ***PACKARD, A. S., Jr., A.M., M.D., Ph.D.** Zoölogy.
Professor of Zoölogy and Geology, Brown University.
Brown University, Providence, R.I.
- ***PEALE, A. C., A.M., M.D.** Geology.
Geologist, U.S. Geological Survey.
Geological Survey, Washington, D.C.
- ***PECKHAM, GEORGE W., M.D.** Biology.
Teacher of Biology, Milwaukee High School.
Milwaukee, Wisconsin.
- ***PIERSOL, GEORGE A., M.D.** Histology.
Demonstrator of Normal Histology, Medical Department,
University of Pennsylvania.
University of Pennsylvania, Philadelphia, Penn.
- ***PILLSBURY, J. H.** Biology.
Professor of Biology, Smith College.
Springfield, Mass.
- ***POWELL, J. W., Ph.D., LL D.** Anthropology and Geology.
Director of the U.S. Geological Survey, and Director of the
Bureau of Ethnology, Smithsonian Institution.
Geological Survey, Washington, D.C.
- ***PRENTISS, A. N., M.S.** Botany.
Professor of Botany, Horticulture, and Arboriculture, Cornell
University.
Cornell University, Ithaca, N.Y.
- ***PRUDDEN, T. MITCHELL, Ph.B , M.D.** Normal and Pathol.
Histology.
Director of the Physiological and Pathological Laboratory of
the Alumni Association of the College of Physicians and
Surgeons, N.Y., and Lecturer on Normal Histology, Yale
Medical School.
114 East 26th street, N.Y.

- ***PUTNAM, FREDERICK W.** Archæology and Ethnology.
Curator of the Peabody Museum of Archæology and Ethnology,
in connection with Harvard University, Permanent Secre-
tary of the American Association for the Advancement of
Science, and Massachusetts State Commissioner on Inland
Fisheries.
Peabody Museum, Cambridge, Mass.
- ***RANDOLPH, N. ARCHER, M.D.** Physiology.
Assistant Demonstrator of Physiology, University of Penn-
sylvania.
University of Pennsylvania, Philadelphia, Penn.
- ***RATHBUN, RICHARD, M.S.** Invertebrates.
Curator, Dep't of Marine Invertebrates, National Museum.
U.S. National Museum, Washington, D.C.
- ***REICHERT, EDWARD T., M.D.** Physiology.
Demonstrator of Physiology, University of Pennsylvania.
University of Pennsylvania, Philadelphia, Penn.
- ***RICE, WILLIAM NORTH, Ph.D., LL.D.** Geology.
Professor of Geology, Wesleyan University.
Middletown, Conn.
- ***RIDGWAY, ROBERT.** Ornithology.
Curator, Dep't of Birds, U.S. National Museum.
Smithsonian Institution, Washington, D.C.
- ***RILEY, C. V., A.M., Ph.D.** Entomology, Mycology.
Entomologist of the U.S. Department of Agriculture, and
Curator of Insects, U.S. National Museum.
1700 13th street, N.W., Washington, D.C.
- ***ROBINSON, JOHN.** Botany.
Treasurer in charge of Museum of the Peabody Academy of
Science at Salem.
Peabody Academy, Salem, Mass.
- ***ROTHROCK, J. T., M.D., B.S.** Botany.
Professor of Botany, University of Pennsylvania.
West Chester, Chester Co., Penn.
- ***RUSSELL, ISRAEL C.** Geology.
U.S. Geological Survey, Washington, D.C.

- ***RYDER, JOHN A., A.M., LL.D.** Embryology.
Special Assistant in Embryology to the U.S. Fish Commission.
U.S. National Museum, Washington, D.C.
- ***SARGENT, CHARLES S.** Botany.
Professor of Arboriculture, Harvard University, and Director of the Arnold Arboretum.
Brookline, Mass.
- ***SCOTT, WILLIAM B., Ph.D.** Animal Morphology.
Professor of Geology and Palæontology, Princeton College.
Princeton, N.J.
- ***SCUDDER, S. H., A.M., S.B.** Entomology and Palæontology.
Cambridge, Mass.
- ***SEDWICK, WILLIAM T., Ph.D.** Biology.
Assistant Professor of Biology, Massachusetts Institute of Technology.
Massachusetts Institute of Technology, Boston, Mass.
- SEWALL, HENRY, B.Sc., Ph.D.** Physiology.
Professor of Physiology, University of Michigan.
Ann Arbor, Michigan.
- ***SHAKESPEARE, E. O., A.M., M.D.** Histology.
Ophthalmic Surgeon and Pathologist to Philadelphia (Charity) Hospital.
1336 Spruce street, Philadelphia, Penn.
- SHALER, N. S., A.M., S.D.** Palæontology.
Professor of Palæontology, Harvard College, and Director of the State Geological Survey of Kentucky.
Cambridge, Mass.
- ***SHARP, BENJAMIN, M.D., Ph.D.** Animal Morphology.
Professor of Invertebrate Zoölogy, Academy of Natural Sciences of Philadelphia.
Academy of Natural Sciences, Philadelphia, Penn.
- ***SHUFELDT, R. W., M.D.** Anatomy of Vertebrates.
Captain, Medical Department, U.S.A.
Care of Smithsonian Institution, Washington, D.C.
- SMITH, ROBERT MEADE, A.M., Ph.D.** Physiology.
Professor of Comparative Physiology, University of Pennsylvania.
332 South Twenty-first street, Philadelphia, Penn.

- SMITH, SANDERSON.** Conchology.
New Brighton, Staten Island, N.Y.
- ***SMITH, SIDNEY I., Ph.B.** Crustacea.
 Professor of Comparative Anatomy, Yale College.
Yale College, New Haven, Conn.
- ***STEJNEGER, LEONHARD, Ph.D.** Ornithology.
 Assistant U.S. National Museum.
U.S. National Museum, Washington, D.C.
- ***STEVENSON, J. J., Ph.D.** Geology.
 Professor, University of the City of New York.
University, Washington square, New York, N.Y.
- ***TRUE, FREDERICK W., M.S.** Vertebrates.
 Librarian and Curator of Mammals, U.S. National Museum.
National Museum, Washington, D.C.
- ***TRYON, G. W., Jr.** Conchology.
 Conservator of the Conchological Department of the
 Academy of Natural Sciences of Philadelphia.
Academy of Natural Sciences, Philadelphia, Penn.
- ***TYLOR, J. M.**
 Professor of Zoölogy and Botany, Amherst College.
Amherst, Mass.
- ***VAN VLECK, B. H., S.B.** Biology.
 Instructor in Biology and Physiology in Boston University.
Boston Society of Natural History, Boston, Mass.
- ***WADSWORTH, M. E., A.M., Ph.D.** Mineralogy and Geology.
 Professor of Mineralogy and Geology, Colby University,
 Assistant in Lithology, Museum Comparative Zoölogy.
Colby University, Waterville, Maine.
- ***WALCOTT, C. D.** Palæontology and Geology.
 Palæontologist, U.S. Geological Survey, and Hon. Curator
 of Invertebrate Palæozoic Fossils, U.S. National Museum.
National Museum, Washington, D.C.
- WARD, HENRY A., A.M.** Natural Science.
 Head of Ward's Natural Science Establishment.
No. 2 College avenue, Rochester, N.Y.

- *WARREN, J. W., A.B., M.D., Physiology.
Assistant in Physiology, Harvard Medical School.
107 Boylston street, Boston, Mass.
- *WHITE, C. A., A.M., M.D., Invertebrate Palæontology.
Curator of Fossil Invertebrates, U.S. National Museum, and
Palæontologist, U.S. Geological Survey.
U.S. National Museum, Washington, D.C.
- *WHITFIELD, R. P., M.A. Palæontology.
(Late Professor at Troy, N.Y.), Curator of Geology,
American Museum of Natural History.
*American Museum of Natural History, 77th street and
8th avenue, New York, N.Y.*
- *WHITMAN, C. O., Ph.D. Animal Morphology.
Assistant in Zoölogy, Museum Comparative Zoölogy.
Museum of Comparative Zoölogy, Cambridge, Mass.
- *WHITNEY, W. F., M.D. Pathology.
Curator of the Museum of the Harvard Medical School.
Harvard Medical School, Boston, Mass.
- *WILDER, BURT G., B.S., M.D. Vertebrate Morphology.
Professor of Physiology, Comparative Anatomy, and Zoölogy.
and Curator of Vertebrate Museum, Cornell University.
Cornell University, Ithaca, N.Y.
- WILLIAMS, GEORGE H., A.B., Ph.D. Mineralogy.
Associate Professor of Mineralogy and Petrography, Johns
Hopkins University.
Johns Hopkins University, Baltimore.
- *WILLIAMS, HENRY S., Ph.D. Palæontology.
Professor of Palæontology, Cornell University, and Assistant
Geologist, U.S. Geological Survey.
Cornell University, Ithaca, N.Y.
- *WILLIAMS, S. G., A.M., Ph.D. Economic Geology.
Professor of Geology, Cornell University.
Cornell University, Ithaca, N.Y.
- *WILSON, EDMUND B., Ph.B., Ph.D. Animal Morphology.
Professor of Biology, Bryn Mawr College, Penn.
Bryn Mawr, Penn.
- *WORTMAN, J. L. Vertebrate Palæontology and Zoölogy.
Anatomist to the U.S. Army Medical Museum.
Army Medical Museum, Washington, D.C.

LIST OF MEMBERS.

83

- *WRIGHT, G. FREDERICK, Rev. Geology.
Oberlin, Ohio.

*WRIGHT, R. RAMSAY, M.A., B.Sc. Zoölogy.
 Professor of Natural History, University College, Toronto,
 Canada.
University College, Toronto, Canada.

*YARROW, H. C., M.D., Acting Asst.-Surg. U.S.A. Herpetology.
 Curator of Herpetology, U.S. National Museum.
National Museum, Washington, D.C.

FOURTH MEETING, AT BOSTON, MASS.**FIRST DAY, DECEMBER 29, 1885.****PHYSIOLOGICAL LECTURE-ROOM, HARVARD MEDICAL SCHOOL.***Morning Session.*

President Gilbert in the chair. Forty members present.

The following was read : —

REPORT OF THE SECRETARY.

The Society now has one hundred and thirty-six members ; there has been a loss of four members by resignation, and a gain of fifteen by election at the last meeting.

There were thirty-two papers presented at the last meeting, which fully occupied the whole of the two days. For the present meeting a considerable number of important communications are expected.

Of the "Records," Part II. has been printed, and is now ready for distribution to the members. It contains the revised constitution and by-laws, and the revised list of members, and also the proceedings proper of the last meeting.

It is pleasant to be able to felicitate the Society on the remarkable immunity of loss from death of its members it has enjoyed. It is certainly very remarkable that in so large a body there should have occurred not a single death during three years. Does the very fact of membership secure us immortality ? It may be noted that election to the Society has become more valuable and sought for since the more stringent rule in regard to admission has been adopted, and there appears to be no question that a rigid enforcement of the strict definition of the term "professional naturalist" will be advantageous for us and will give election to the Society the prestige and significance of a well-earned scientific degree.

It has been suggested that the Society might undertake to publish a series of semi-popular monographs on the Natural History of the North Atlantic Region. It is deemed probable that a publisher could be found willing to undertake such a series of volumes, of moderate size and cost ; perhaps duodecimos of some

four hundred pages. For instance, volumes might be written on the climate; another, to accompany a geological map, on the physiography, evergreens, mammals, etc.; and these volumes might be not only readable and interesting to the public, but also contributions of permanent value to science; for experience has shown that technical language is not indispensable for recording knowledge. As it seems very desirable to widen the scope of the Society's usefulness your Secretary respectfully recommends that a committee of seven, to include the President, be appointed to consider the matter, and with full powers to take such steps as may seem to them desirable,—it being understood that this committee is not to form a board of editors,—which, if it shall become necessary, shall be appointed in such manner as the Society at its next meeting shall determine.

Your Secretary, in presenting his last report, begs to thank all the members for the kindly relations which they have maintained with him throughout his period of office, and to express his more than readiness to be at the service of the Society hereafter to the extent of his ability and whenever called upon.

Respectfully submitted,

CHARLES SEDGWICK MINOT,
Secretary.

It was moved, seconded, and carried, to accept the report.

The following persons were elected members: Walter B. Barrows, F. J. H. Merrill, J. Francis Walsh.

Upon recommendation of the Executive Committee it was voted to amend Article I., Section 1, of the Constitution, so that it shall read:—

This association shall be called the American Society of Naturalists.

The following letter was read:—

“ BOTANIC GARDEN,
“ CAMBRIDGE, MASS., Dec. 18, 1885.

“ CHAS. S. MINOT, Esq., *Secretary of the Society of Naturalists, E. U. S.*:—

“ DEAR SIR,—Accept my thanks for the invitation to attend the ensuing meeting of your Society. I will do so, if my time

will allow. It is not probable that I can find time to prepare any communication.

"I understand from Prof. Goodale that your Society may, as a body or by many of your members, visit Cambridge together upon one of your days of session. Should you do so I shall be glad to receive the members here at any convenient hour in the afternoon, and would ask them to take a cup of tea with Mrs. Gray and myself.

"Hoping the Society may do us this honor,

"I remain, dear sir,

"Very truly yours,

"ASA GRAY."

Prof. George L. Goodale invited the Society to hold one of its sessions in Harvard Hall, and to visit the botanical laboratory of Harvard College.

It was voted to accept the kind invitations of Professor Gray and Professor Goodale for Wednesday afternoon, with the cordial thanks of the Society, and to hold an afternoon session on Dec. 30, at 2.30 P.M., in Harvard Hall.

The following letter was read:—

"PHILADELPHIA, Oct. 21, 1885.

"DEAR DR. MINOT:—

"I believe I neglected to refer, in my last, to your proposition that the 'Naturalist' become the official organ, or medium of publication, of the Society of Naturalists for the E.U.S.

"For my own part I should be glad to have it become so. Already its department of microscopy publishes material which covers a large department of the Society's work, and the rest of the Journal is, of course, open to anything that does not enter that department.

"Very truly yours,

"E. D. COPE."

The Secretary announced that the Executive Committee had carefully considered the subject, and considered it undesirable to maintain any other *official* publication than the "Records" of the Society; but they hope that the members will all feel inclined

to send any suitable papers read before the Society to the "American Naturalist" for publication.

The following committee to nominate officers for the ensuing year was appointed by the Chair: Messrs. Hyatt, Lee, Emerson, Rice, and Comstock.

Messrs. Davis and Kingsley were appointed a committee to audit the accounts of the Treasurer.

The chair was then taken by Vice-President H. N. Martin, and the President delivered his address entitled: "The inculcation of scientific method by example, with an illustration drawn from the quaternary geology of Utah," by G. K. Gilbert.

[This address has since been published in full in "The American Journal of Science" for April, 1886.—*Sec.*]

The following papers were read: —

1. Prof. E. S. MORSE. On museum cases.
2. Dr. H. P. BOWDITCH. Demonstration of physiological apparatus.
3. Dr. H. P. BOWDITCH. Model of the eye for class demonstrations.

TUESDAY, DECEMBER 29, 1885.

HARVARD MEDICAL SCHOOL.

Afternoon Session.

President Gilbert in the chair. Thirty-eight members present.
The following papers were read: —

1. Prof. B. G. WILDER. On the use of alinjected sheep's hearts in class practicums.
2. Prof. B. G. WILDER. Illustrations of the advantages of alinjection, vascular and visceral, in preserving material for class practicums and for permanent preparations.
3. Dr. THOMAS DWIGHT. Modern anatomical methods.
4. Dr. S. J. MIXTER. Exhibition of corrosive preparations.
5. Dr. H. C. ERNST. Cultivation of micro-organisms.
6. Prof. W. M. DAVIS. Methods of observing thunder-storms and discussing the results.

7. Dr. J. W. WARREN. Exhibition of a reaction time apparatus.
8. Dr. J. W. WARREN. A simplified demonstration of the reaction of saliva.
9. Prof. R. R. WRIGHT. Improvement in rocking microtome.
10. Prof. R. R. WRIGHT. Photography as an aid to Natural History demonstration.

After some debate the motion to consider the proposition to appoint a committee of seven, made in the Secretary's report, was laid over.

Prof. F. W. Putnam invited the members of the Society to visit the Peabody Museum of Archæology.

The Committee on Nominations presented the following report: —

The expiration of the term of service of the first Vice-President obliges the committee to supersede this active and earnest officer.

They also regret that the resignation of the Secretary, which is final and unreserved, admits of no alternative but the nomination of another person in place of the present energetic and popular incumbent.

They have, therefore, prepared the following list of nominees for presentation to the society: —

For President. — G. K. GILBERT.

For Vice-Presidents. — E. D. COPE,

HARRISON ALLEN,
GEO. L. GOODALE.

For Secretary. — SAMUEL F. CLARKE.

For Treasurer. — C. A. ASHBURNER.

For Executive Committee. — R. RAMSAY WRIGHT,

CHARLES SEDGWICK MINOT.

(Signed,) A. HYATT.

L. A. LEE.

B. K. EMERSON.

W. N. RICE.

J. H. COMSTOCK.

An affirmative vote for the nominees of the committee was cast by the Secretary in accordance with the instructions of the Society, and the persons nominated were declared elected for the ensuing year.

FOURTH MEETING, AT BOSTON, MASS.

SECOND DAY, DEC. 30, 1885.

PHYSIOLOGICAL LECTURE-ROOM, HARVARD MEDICAL SCHOOL.

President Gilbert in the chair. Thirty-seven members present.

It was voted, in accordance with the recommendation of the Executive Committee, to amend Article II. of the Constitution by adding a new section, as follows:—

Section III. Honorary members, exempt from the payment of dues, may be elected, upon recommendation of the Executive Committee, by a two-thirds vote of the members present at any meeting of the Society. The number of honorary members is limited to five.

The following honorary members were elected: S. F. Baird, James D. Dana, and Asa Gray.

The following members were elected: Thomas Dwight, H. C. Ernst, S. J. Mixter, and Leonhard Stejneger.

The Secretary announced that the Executive Committee had voted to hold the next meeting of the Society at Philadelphia, Dec. 29 and 30, 1886.

It was voted to appoint a committee of three to consider the question of establishing a bureau of information. The Chair appointed the following gentlemen the committee: Messrs. Wm. North Rice, A. Hyatt, and G. Brown Goode.

The following letters were read:—

“ BOSTON SOCIETY OF NATURAL HISTORY,

“ BERKELEY ST., BOSTON, MASS., Dec. 30, 1885.

“ The Boston Society of Natural History respectfully invite the Society of Naturalists of the Eastern United States to visit and

make use of their Museum and Library during their stay in this city.

"ALPHEUS HYATT, *Curator.*
"EDWARD BURGESS, *Secretary.*"

"MASS. INST. OF TECHNOLOGY, Dec. 30, 1885.

"CHARLES S. MINOT, *Secretary:*—

"DEAR SIR,—I am requested by General F. A. Walker to extend to the American Society of Naturalists a cordial invitation to visit the institute which is now in session, and to examine its different departments. I desire also personally to invite the members to visit the biological department, at any time during their stay in Boston.

"Yours very truly,

"WM. T. SEDGWICK."

The following papers were read:—

1. Prof. S. H. GAGE. Dunnington's method of making colored diagrams, with modifications.
2. Prof. B. G. WILDER. Exhibition of preparations illustrating certain branch and class characters.
3. Dr. CHARLES A. OLIVER. Apparatus for the investigation of the color sense.
4. Prof. J. H. COMSTOCK. A new method of arranging entomological collections.
5. Dr. HARRISON ALLEN. Exhibition of photographs in illustration of animal motion.
6. Prof. M. E. WADSWORTH. Laboratory instruction in mineralogy.
7. Mr. J. S. KINGSLEY. Some photographic processes of illustration.
8. Prof. A. HYATT. Museology.
9. Prof. W. O. CROSBY. Arrangement of the mineralogical collection of the Boston Society of Natural History.
10. Prof. W. M. DAVIS. Geological sections, illustrating rate of deposit and thickness of formations.

WEDNESDAY, DECEMBER 30, 1885.

HARVARD HALL, CAMBRIDGE, MASS.

Afternoon Session.

President Gilbert in the chair. Thirty-six members present.

The following papers were read:—

1. Dr. C. O. WHITMAN. Osmic acid and Merkel's fluid in embryological research.
2. Prof. W. G. FARLOW. Teaching biology at college.
3. Prof. W. M. DAVIS. On the use of models for instruction in geology.
4. Dr. C. S. MINOT. Some improvements in histological technique.
5. Prof. GEO. L. GOODALE. Exhibition of botanical physiological apparatus.

The following was read:—

REPORT OF THE TREASURER.

1884.	Dr.
Dec. 26. By cash balance	\$66 31
1885.	
Dec. 28. By annual subscriptions rec'd by Secretary	60 00
“ “ By annual subscriptions rec'd by Treasurer	212 00
	<hr/> \$338 31
1885.	
Apr. 4. To 2 account-books	\$2 00
Dec. 28. “ stamps	2 04
“ “ “ balance in hands of Secretary .	60 00
“ “ “ balance in hands of Treasurer,	274 27
	<hr/> \$338 31

CHAS. A. ASHBURNER,
Treasurer.

The Auditing Committee made the following report:—

CAMBRIDGE, MASS., Dec. 30, 1885.

The undersigned have examined the accounts of Charles A. Ashburner, Treasurer of the Society of Naturalists of the Eastern United States, and, with the exception of slight clerical errors that readily explain themselves, have found them correctly stated.

W. M. DAVIS.
J. S. KINGSLEY.

It was moved to accept and adopt this report. Seconded and *carried*.

It was moved that the most cordial thanks of the Society be expressed to the authorities of the Harvard Medical School and to Prof. George L. Goodale for the very kind hospitalities shown to the Society during this meeting.

The Society then adjourned.

(Signed,) CHARLES SEDGWICK MINOT,
Secretary.



RECORDS
OF THE
AMERICAN SOCIETY
OF
NATURALISTS.

VOLUME I.,
PART FOURTH.
—

BOSTON:
PUBLISHED BY THE SECRETARY.
1887.



R E C O R D S.

LIST OF OFFICERS FOR 1887.

President, HARRISON ALLEN.
Vice-Presidents, { E. D. COPE,
 GEORGE L. GOODALE,
 HENRY S. WILLIAMS.
Secretary, SAMUEL F. CLARKE.
Treasurer, WILLIAM T. SEDGWICK.

*Members of the Executive Committee Elected from the
Society at Large.*

HENRY F. OSBORN, CHARLES V. RILEY.

LIST OF HONORARY MEMBERS.

***DANA, JAMES D.**, Ph.D., LL.D., Mineralogy, Zoölogy, Geology.
Professor of Geology, Yale College.
Yale College, New Haven, Conn.

GRAY, ASA, A.M., M.D., LL.D. Botany.
Fisher Professor of Natural History and Director of the
Herbarium, Harvard College.
Cambridge, Mass.

LEIDY, JOSEPH, M.D., LL.D. Zoölogy.
Professor of Anatomy, University of Pennsylvania ; Director
Biological Department, University of Pennsylvania ; Di-
rector Wagner Institute of Science, Phila. ; President
Academy of Natural Sciences, Phila.

LESLEY, JOSEPH P., A.M., LL.D. Geology.
State Geologist of Pennsylvania.
907 Walnut street, Philadelphia, Penn.

LIST OF MEMBERS.

[An asterisk designates original membership.]

- ALLEN, C. M. Natural History.
Wyoming Seminary, Kingston, Penn.
- *ALLEN, HARRISON, M.D. Comparative Anatomy and Physiology.
117 South 20th street, Philadelphia, Penn.
- *ASHBURNER, CHARLES A., M.S., C.E. Geology.
907 Walnut street, Philadelphia, Penn.
- BARROWS, WALTER B., B.S. Ornithology.
Curator of the Museum of Wesleyan University.
Middletown, Conn.
- BENEDICT, JAMES E., A.M. Natural History.
Naturalist U.S. Fish Commission, Str. "Albatross."
Smithsonian Institution, Washington, D.C.
- *BICKMORE, ALBERT S. Anthropology and Zoölogy.
Superintendent of the American Museum of Natural History.
American Museum, Central Park, N.Y.
- BOLTON, H. CARRINGTON, A.M., Ph.D. Mineralogy, Chemistry.
Professor of Chemistry and Mineralogy, Trinity College.
Trinity College, Hartford, Conn.
- *BOWDITCH, HENRY P., A.M., M.D. Physiology.
Professor of Physiology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- *BRITTON, N. L., E.M., Ph.D. Botany and Geology.
Assistant in Geology and Botany, School of Mines, Columbia
College, and Botanist, Geological Survey of New Jersey.
School of Mines, Columbia College, N.Y.
- BRUSH, G. J. Mineralogy.
Director, Sheffield Scientific School, New Haven, Conn.
- BUMPUS, H. C., Ph.B. Zoölogy.
Professor of Biology and Geology, Olivet College.
Olivet, Michigan.

- *BURGESS, EDWARD, A.B. Entomology.
Secretary of the Boston Society of Natural History, and
Instructor in Entomology at Bussey Institution of Harvard
University.
Boston Society of Natural History, Boston, Mass.
- CALL, R. ELLSWORTH. Tertiary Palæontology, Mollusca.
Assistant Professor in Geology and Zoölogy, University of
Missouri.
Columbia, Missouri.
- *CLARKE, SAMUEL F., Ph.B., Ph.D. Zoölogy.
Professor of Natural History, Williams College.
Williamstown, Mass.
- *COMSTOCK, J. HENRY, B.S. Entomology.
Professor of Economic Entomology and General Invertebrate
Zoölogy, Cornell University.
Cornell University, Ithaca, N.Y.
- *COPE, EDWARD D. Palæontology and Zoölogy.
2100 Pine street, Philadelphia, Penn.
- *COUES, ELLIOTT, A.M., M.D., Ph.D. Vertebrates, Bibliog-
raphy.
Smithsonian Institution, Washington, D.C.
- *CROSBY, W. O., S.B. Geology.
Assistant Professor of Mineralogy and Lithology, Massachu-
sets Institute of Technology.
Institute of Technology, Boston, Mass.
- DALL, WILLIAM HEALEY. Mollusca, Palæontology.
Palæontologist U.S. Geological Survey, Honorary Curator
of Department of Molluscs, U.S. National Museum.
Smithsonian Institution, Washington, D.C.
- *DAVIS, WILLIAM M., S.B., M.E. Geology, Geography, and Meteorology.
Assistant Professor of Physical Geography, Harvard College.
Museum of Comparative Zoölogy, Cambridge, Mass.
- *DEWEY, Frederic P., Ph.B. Metallurgy.
Curator of Metallurgy, U.S. National Museum.
National Museum, Washington, D.C.
- *DILLER, J. S. Micropetrography and Geology.
Assistant Geologist, U.S. Geological Survey.
U.S. Geological Survey, Washington, D.C.

- *DIMMOCK, GEORGE, Ph.D. Zoölogy.
Cambridge, Mass.
- DOLLEY, CHARLES S. Biology.
 Professor of Biology in Swarthmore College; Instructor in Biology in the University of Pennsylvania.
University of Pennsylvania, Biological Department.
- *DONALDSON, HENRY H., Ph.D. Physiology.
 Assistant in Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- *DUDLEY, WILLIAM R., M.S. Cryptogamic Botany.
 Assistant Professor of Cryptogamic Botany, Cornell University.
Cornell University, Ithaca, N.Y.
- *DUTTON, C. E. Geology.
 Captain of Ordnance, U.S.A.
U.S. Geological Survey, Washington, D.C.
- DWIGHT, WILLIAM B., B.A., M.A., Ph.B. Palæontology.
 Professor of Zoölogy and Curator of the Museum, Vassar College.
Vassar College, Poughkeepsie, N.Y.
- *DWIGHIT, THOMAS, A.M., M.D. Anatomy.
 Parkman Professor of Anatomy, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- *EMERSON, B. K., Ph.D. Geology and Mineralogy.
 Professor of Geology, Amherst College.
Amherst, Mass.
- *EMERTON, JAMES H. Zoölogy.
 Assistant in Zoölogy, Yale College.
Yale College, New Haven, Conn.
- *EMMONS, S. F. Geology.
 Geologist of the U.S. Geological Survey.
Geological Survey, Washington, D.C.
- ERNST, HAROLD C., A.M., M.D. Bacteriology.
 Demonstrator of Bacteriology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- *FARLOW, WM. G., A.B., M.D. Botany.
 Professor of Cryptogamic Botany, Harvard College.
Harvard College, Cambridge, Mass.

- ***FERNALD, C. H., A.M.** Microlepidoptera.
 Professor of Zoölogy, Mass. Agricultural College.
Amherst, Mass.
- Fox, L. WEBSTER, M.D.** Anatomy and Physiology.
 Clinical Assistant, Jefferson Medical College Hospital.
1304 Walnut street, Philadelphia, Penn.
- FRAZER, PERSIFOR, D. Sc.** Geology and Chemistry.
201 S. Fifth street, Philadelphia, Penn.
- ***GAGE, SIMON H., S.B.** Vertebrate Morphology and Physiology.
 Assistant Professor of Physiology, and Lecturer on Microscopical Technology, Cornell University.
Cornell University, Ithaca, N.Y.
- ***GARDINER, EDWARD G., B.S., Ph.D.** Zoölogy.
 Assistant in Biology, Massachusetts Institute of Technology.
289 Marlborough street, Boston, Mass.
- GARMAN, SAMUEL.** Zoölogy.
 Assistant, Museum Comp. Zoölogy.
Cambridge, Mass.
- ***GERRISH, FREDERICK HENRY, A.M., M.D.** Anatomy.
 Professor of Anatomy, Bowdoin College.
675 Congress street, Portland, Me.
- ***GILBERT, G. K.** Geology.
 Geologist of the U.S. Geological Survey.
Geological Survey, Washington, D.C.
- ***GOODALE, GEORGE L., A.M., M.D.** Botany.
 Professor of Botany, Harvard College.
Harvard College, Cambridge, Mass.
- ***GOODE, G. BROWN, A.M.** Zoölogy.
 Secretary of the Smithsonian Institution, and Assistant Director U.S. National Museum.
Smithsonian Institution, Washington, D.C.
- GRATACAP, L. P., M.A., Ph.B.** Mineralogy and Geology.
 Assistant Curator of Geology, American Museum of Natural History, New York.
77th street and 8th avenue, New York, N.Y.
- ***GREENLEAF, R. W., A.M., M.D.** Botany.
Boston City Hospital, Boston, Mass.

- GREGORY, EMILY L., Ph.D.** Botany.
 Associate in Botany, Bryn Mawr College.
Bryn Mawr, Penn.
- HAQUE, ARNOLD.** Geology and Petrography.
 Geologist, U.S. Geological Survey.
Geological Survey, Washington, D.C.
- *HALL, JAMES, M.S., A.M., M.D., LL.D.** Geology, Palæontology.
 State Geologist of New York, Director of the State Museum
 of Natural History.
State Museum, Albany, N.Y.
- HARE, HOBART, M.D.** Physiology.
 Demonstrator of Experimental Therapeutics, University of
 Pennsylvania.
117 South Twenty-second street, Philadelphia, Penn.
- *HAYDEN, F. V., M.D., LL.D.** Geology.
 Geologist, U.S. Geological Survey.
1803 Arch street, Philadelphia, Penn.
- *HEILPRIN, ANGELO.** Palæontology and Geology.
 Professor of Invertebrate Palæontology at, and Curator-in-
 charge of, the Academy of Natural Sciences of Phila-
 delphia, and Professor of Geology at the Wagner Free
 Institute of Science.
Academy of Natural Sciences, Philadelphia, Penn.
- *HENSHAW, SAMUEL.** Zoölogy.
 Assistant, Boston Society of Natural History.
Boston Society of Natural History, Boston, Mass.
- *HILL, FRANK A.** Geology.
 Assistant Geologist, State Survey of Pennsylvania.
907 Walnut street, Philadelphia, Penn.
- *HITCHCOCK, C. H., Ph.D.** Geology.
 Professor of Geology and Mineralogy, Dartmouth College.
Hanover, N.H.
- HITCHCOCK, ROMYN.** Fresh Water Algæ.
 Acting Curator, U.S. National Museum.
Smithsonian Institution, Washington, D.C.
- *HOLDER, J. B., M.D.** Zoölogy.
 Curator of Invertebrate Zoölogy, Am. Museum Nat. History.
American Museum, Central Park, N.Y.

- HOWELL, WILLIAM H., B.A., Ph.D. Physiology.
Associate in Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- HUNT, T. STERRY, A.M., LL.D. Mineralogy and Geology.
Montreal, Canada.
- *HYATT, ALPHEUS, S.B. Palæontology and Zoölogy.
Curator of the Boston Society of Natural History, and Professor of Zoölogy and Palæontology at the Massachusetts Institute of Technology.
Boston Society of Natural History, Boston, Mass.
- IDDINGS, JOSEPH P., Ph.B. Geology and Lithology.
Assistant Geologist, U.S. Geological Survey.
American Museum, Central Park, New York, N.Y.
- JAYNE, HORACE, M.D. Vertebrata.
Professor of Vertebrate Morphology, University of Pennsylvania.
Biological Department, University of Pennsylvania, Philadelphia, Penn.
- JEFFRIES, J. AMORY, A.B., M.D. Anatomy.
78 Devonshire street, Boston, Mass.
- *JULIEN, ALEXIS A., Ph.D. Petrography.
Assistant in Chemistry and Microscopy, School of Mines, Columbia College.
School of Mines, Columbia College, New York, N.Y.
- *KIDDER, J. H., A.M., M.D. Chemist.
Chemist, U.S. Fish Commission.
Smithsonian Institution, Washington, D.C.
- *KINGSLEY, J. S., D.Sc. Zoölogy.
Editor of the "Standard Natural History."
University of Indiana, Bloomington, Indiana.
- LEE, F. S., Ph.D., A.M. Physiology.
Associate in Biology, Bryn Mawr College.
Bryn Mawr, Penn.
- *LEE, LESLIE A., Ph.D. Geology and Biology.
Professor of Geology and Biology, Bowdoin College.
Brunswick, Me.

LEIDY, JOSEPH, M.D., LL.D.

Professor of Anatomy in the University of Pennsylvania, and Director of the Biological Department, President of the Faculty of the Wagner Free Institute, and President of the Academy of Natural Sciences, Philadelphia.

***LEWIS, H. CARVILL, A.M.** Geology and Mineralogy.

Professor of Mineralogy, Academy of Natural Sciences of Philadelphia, and Professor of Geology at Haverford College, Haverford, Penn.

Academy of Natural Sciences, Philadelphia, Penn.

***LIBBEY, WILLIAM, Jr., A.M., D.Sc.** Histology.

Professor of Physical Geography, Princeton College, and Director of the E. M. Museum of Geology and Archaeology.

Princeton, N.J.

***MACCOSKIE, GEORGE, D.Sc., LL.D.** Biology.

Professor of Biology, Princeton College.

Princeton, N.J.

***MARCOU, JOHN B.** Geology.

Assistant Geologist, U.S. Geological Survey.

U.S. National Museum, Washington, D.C.

***MARSHALL, JOHN P., A.M.** Mineralogy and Geology.

Professor of Mineralogy and Geology, Tufts College.

College Hill, Mass.

***MARTIN, H. NEWELL, A.M., M.D., D.Sc., F.R.S.** Physiology.

Professor of Biology, Johns Hopkins University.

Johns Hopkins University, Baltimore, Md.

***McGEE, W. J.** Geology.

Geologist, U.S. Geological Survey.

U.S. Geological Survey, Washington, D.C.

McMURRICH, J. PLAYFAIR, M.A., Ph.D. Animal Morphology.

Late Instructor in Osteology and Mammalian Anatomy, Johns Hopkins University; Professor of Biology, Haverford College.

Haverford College, Penn.

***MEEHAN, THOMAS.**

Botanist to the Pennsylvania State Board of Agriculture, Vice-President Academy of Natural Sciences, Philadelphia.

Germantown, Penn.

- ***MERRIAM, C. HART, M.D.** Mammals and Birds.
Chief of Division of Economic Ornithology and Mammalogy
of the U.S. Department of Agriculture, Secretary of the
American Ornithologists' Union, and Chairman of its
Committee on the Migration and Geographical Distribu-
tion of North American Birds.
Washington, D.C.
- MERRILL, F. J. H., Ph.B.** Geology.
Assistant Geologist, Geological Survey of New Jersey.
126 E. 60th street, New York, N.Y.
- ***MERRILL, GEORGE P., M.S.** Lithology.
Acting Curator of Lithology and Physical Geology, U.S.
National Museum.
National Museum, Washington, D.C.
- ***MINOT, CHARLES SEDGWICK, S.B., S.D.** Biology.
Instructor in Embryology and Histology, Harvard Medical
School.
Harvard Medical School, Boston, Mass.
- MIXTER, SAMUEL J., B.S., M.D.** Anatomy.
Assistant Demonstrator of Anatomy, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- ***MORSE, EDWARD S., Ph.D.** Anthropology and Zoölogy.
Director of the Peabody Academy of Science, Salem, Mass.
Salem, Mass.
- ***NEWBERRY, J. S., M.D., LL.D.** Geology.
Professor of Geology, School of Mines, Columbia College.
School of Mines, Columbia College, New York, N.Y.
- ***NILES, WILLIAM H., A.M., Ph.B.** Physical Geography and
Historical Geology.
Professor of Geology and Geography, Massachusetts Insti-
tute of Technology.
Mass. Institute of Technology, Boston, Mass.
- OLIVER, CHARLES A., A.M., M.D.** Special sense Morphology
and Physiology.
Ophthalmic and Aural Surgeon to St. Mary's Hospital, Phila-
delphia.
1507 Locust street, Philadelphia, Penn.

- ***OSBORN, HENRY F., Sc.D.** Vertebrate Morphology.
Professor of Comparative Anatomy, Princeton College.
Princeton, N.J.
- ***PACKARD, A. S., Jr., A.M., M.D., Ph.D.** Zoölogy.
Professor of Zoölogy and Geology, Brown University.
Brown University, Providence, R.I.
- ***PEALE, A. C., A.M., M.D.** Geology.
Geologist, U.S. Geological Survey.
Geological Survey, Washington, D.C.
- ***PECKHAM, GEORGE W., M.D.** Biology.
Teacher of Biology, Milwaukee High School.
Milwaukee, Wisconsin.
- ***PILLSBURY, J. H.** Biology.
Professor of Biology, Smith College.
Springfield, Mass.
- ***POWELL, J. W., Ph.D., LL.D.** Anthropology and Geology.
Director of the U.S. Geological Survey, and Director of the
Bureau of Ethnology, Smithsonian Institution.
Geological Survey, Washington, D.C.
- ***PRENTISS, A. N., M.S.** Botany.
Professor of Botany, Horticulture, and Arboriculture, Cornell
University.
Cornell University, Ithaca, N.Y.
- PROSSER, CHARLES S., M.S.** Palæontology.
Instructor in Palæontology, Cornell University.
Ithaca, N.Y.
- ***PUTNAM, FREDERICK W.** Archæology and Ethnology.
Curator of the Peabody Museum of Archæology and Ethnology,
in connection with Harvard University; Permanent
Secretary of the American Association for the Advance-
ment of Science; and Massachusetts State Commissioner
on Inland Fisheries.
Peabody Museum, Cambridge, Mass.
- RANDOLPH, N. ARCHER, M.D.** Physiology.
Assistant Demonstrator of Physiology, University of Penn-
sylvania.
University of Pennsylvania, Philadelphia, Penn.

- ***RATHBUN, RICHARD, M.S.** Invertebrates.
Curator, Dep't of Marine Invertebrates, National Museum.
U.S. National Museum, Washington, D.C.
- REICHERT, EDWARD T., M.D.** Physiology.
Demonstrator of Physiology, University of Pennsylvania.
University of Pennsylvania, Philadelphia, Penn.
- ***RICE, WILLIAM NORTH, Ph.D., LL.D.** Geology.
Professor of Geology, Wesleyan University.
Middletown, Conn.
- ***RILEY, C. V., A.M., Ph.D.** Entomology, Mycology.
Entomologist of the U.S. Department of Agriculture, and
Curator of Insects, U.S. National Museum.
1700 13th street, N.W., Washington, D.C.
- ***ROTHROCK, J. T., M.D., B.S.** Botany.
Professor of Botany, University of Pennsylvania.
West Chester, Chester Co., Penn.
- ***RUSSELL, ISRAEL C.** Geology.
U.S. Geological Survey, Washington, D.C.
- RYDER, JOHN A., A.M.** Embryology.
Professor of Comparative Embryology, Univ. of Penn.
Biological Dept., Univ. of Penn., Philadelphia, Penn.
- ***SARGENT, CHARLES S.** Botany.
Professor of Arboriculture, Harvard University, and Director of the Arnold Arboretum.
Brookline, Mass.
- ***SCOTT, WILLIAM B., Ph.D.** Animal Morphology.
Professor of Geology and Palæontology, Princeton College.
Princeton, N.J.
- ***SCUDDER, S. H., A.M., S.B.** Entomology and Palæontology.
Cambridge, Mass.
- ***SEDGWICK, WILLIAM T., Ph.D.** Biology.
Associate Professor of Biology, Massachusetts Institute of Technology.
Massachusetts Institute of Technology, Boston, Mass.
- SEWALL, HENRY, B.Sc., Ph.D.** Physiology.
Professor of Physiology, University of Michigan.
Ann Arbor, Mich.

- *SHAKESPEARE, E. O., A.M., M.D. Histology.
Ophthalmic Surgeon and Pathologist to Philadelphia
(Charity) Hospital.
1336 Spruce street, Philadelphia, Penn.

SHALER, N. S., A.M., S.D. Palaeontology.
Professor of Palaeontology, Harvard College, and Director
of the State Geological Survey of Kentucky.
Cambridge, Mass.

*SHARP, BENJAMIN, M.D., Ph.D. Animal Morphology.
Professor of Invertebrate Zoölogy, Academy of Natural
Sciences of Philadelphia.
Academy of Natural Sciences, Philadelphia, Penn.

*SHUFELDT, R. W., M.D. Anatomy of Vertebrates.
Captain, Medical Department, U.S.A.
Care of Smithsonian Institution, Washington, D.C.

SMITH, ROBERT MEADE, A.M., Ph.D. Physiology.
Professor of Comparative Physiology, University of Penn-
sylvania.
332 South Twenty-first street, Philadelphia, Penn.

*SMITH, SIDNEY I., Ph.D. Crustacea.
Professor of Comparative Anatomy, Yale College.
Yale College, New Haven, Conn.

STEJNEGER, LEONHARD, Ph.D. Ornithology.
Assistant, U.S. National Museum.
U.S. National Museum, Washington, D.C.

*STEVENSON, J. J., Ph.D. Geology.
Professor, University of the City of New York.
University, Washington square, New York, N.Y.

*TRUE, FREDERICK W., M.S. Vertebrates.
Librarian and Curator of Mammals, U.S. National Mu-
seum.
National Museum, Washington, D.C.

*TRYON, G. W., Jr. Conchology.
Conservator of the Conchological Department of the
Academy of Natural Sciences of Philadelphia.
Academy of Natural Sciences, Philadelphia, Penn.

- TUCKERMAN, FREDERICK, M.D. Anatomy and Physiology.
Professor, Anatomy and Physiology, Mass. Agricultural
College.
Amherst, Mass.
- *TYLER, J. M., A.B.
Professor of Zoölogy and Botany, Amherst College.
Amherst, Mass.
- *VAN VLECK, B. H., S.B. Biology.
Instructor in Biology and Physiology in Boston University.
Boston Society of Natural History, Boston, Mass.
- *WADSWORTH, M. E., A.M., Ph.D. Mineralogy and Geology.
Professor of Mineralogy and Geology, Colby University.
Assistant in Lithology, Museum Comparative Zoölogy.
Colby University, Waterville, Me.
- *WALCOTT, C. D. Palæontology and Geology.
Palæontologist, U.S. Geological Survey, and Hon. Curator
of Invertebrate Palæozoic Fossils, U.S. National Museum.
National Museum, Washington, D.C.
- *WARD, HENRY A., A.M. Natural Science.
Head of Ward's Natural Science Establishment.
No. 2 College avenue, Rochester, N.Y.
- *WARREN, J. W., A.B., M.D. Physiology.
Assistant in Physiology, Harvard Medical School.
107 Boylston street, Boston, Mass.
- *WHITFIELD, R. P., M.A. Palaeontology.
(Late Professor at Troy, N.Y.), Curator of Geology,
American Museum of Natural History.
*American Museum of Natural History, 77th street and
8th avenue, New York, N.Y.*
- *WHITMAN, C. O., Ph.D. Animal Morphology.
Editor, Journal of Morphology, Lake Laboratory.
Milwaukee, Wis.
- *WHITNEY, W. F., M.D. Pathology.
Curator of the Museum of the Harvard Medical School.
Harvard Medical School, Boston, Mass.
- *WILDER, BURT G., B.S., M.D. Vertebrate Morphology.
Professor of Physiology, Comparative Anatomy, and Zoölogy,
and Curator of Vertebrate Museum, Cornell University.
Cornell University, Ithaca, N.Y.

- WILLIAMS, GEORGE H., A.B., Ph.D. Mineralogy.
Associate Professor of Mineralogy and Petrography, Johns Hopkins University.
Johns Hopkins University, Baltimore.
- *WILLIAMS, HENRY S., Ph.D. Geology and Palæontology.
Professor of Geology and Palæontology, Cornell University,
and Assistant Geologist, U.S. Geological Survey.
Cornell University, Ithaca, N.Y.
- *WILSON, EDMUND B., Ph.B., Ph.D. Animal Morphology.
Professor of Biology, Bryn Mawr College, Penn.
Bryn Mawr, Penn.
- *WRIGHT, R. RAMSAY, M.A., B.Sc. Zoölogy.
Professor of Natural History, University College, Toronto,
Canada.
University College, Toronto, Canada.
- *YARROW, H. C., M.D., Acting Asst.-Surg. U.S.A. Herpetology.
Curator of Herpetology, U.S. National Museum.
814 17th street, N.W., Washington, D.C.

FIFTH MEETING, AT PHILADELPHIA, PENN.**DECEMBER 28, 1886.****ASSEMBLY ROOM OF THE ENGINEERS' CLUB, OF PHILADELPHIA.****MORNING SESSION.**

President Gilbert in the chair. Thirty-five members present.

The report of the last session of the preceding annual meeting was read and adopted.

Upon recommendation of the Executive Committee it was voted that the annual assessment of two dollars shall be considered due in advance at the annual meeting. This will change Section 2 of Article II. of the Constitution so as to read, "Each member shall pay to the Treasurer an annual assessment of two dollars, which shall be considered due at the annual meeting, in advance."

The name of Professor Joseph Leidy, recommended to the Society by the Executive Committee for honorary membership, was unanimously elected.

The names of Dr. Persifor Frazer and Professor C. A. Dolley were recommended to the Society by the Executive Committee, and were unanimously elected.

The President appointed as a committee to nominate officers for the fiscal year, Messrs. Farlow, Heilprin, Jayne, McGee, and Niles.

Messrs. Rothrock and Diller were appointed to the Auditing Committee by the President.

The Society then listened to the presidential address upon "Special Processes of Research," which has since been published in the *American Journal of Science* for June, 1887.

Professor E. B. Wilson, of Bryn Mawr, read a paper on "The Practical Study of Moulds," which was very interestingly illustrated by numerous mounted specimens.

After the announcement of the programme for the afternoon, the following invitations were read:—

" 1811 SPRUCE STREET.

" To Dr. HORACE JAYNE : —

" DEAR DOCTOR, — May I beg you to transmit to the American Society of Naturalists a cordial invitation to visit the University at all times during the session of that body.

" Yours faithfully,

" WILLIAM PEPPER,

" Provost.

" December 28, 1886."

" PHILADELPHIA, Dec. 22, 1886.

" HARRISON ALLEN, M.D., *Chairman of the Local Committee, American Society of Naturalists* : —

" DEAR SIR, — I have the pleasure to inform you that at the meeting of the Academy, held last evening, it was voted to tender the freedom of the museum and library to the members of the American Society of Naturalists during the coming meeting on the 28th and 29th inst.

" It is hoped that the Academy may be able to contribute in some degree to the interest and profit of the session.

" I remain,

" Yours very truly,

" EDWARD J. NOLAN,

" *Recording Secretary.*"

" SWARTHMORE COLLEGE,

" SWARTHMORE, PA., 12 Mo. 25, 1886.

" *To the Society of Naturalists convened in Philadelphia* : —

" ESTEEMED FRIENDS, — If at any time during the progress of your meetings in Phila., or at their close, it would be agreeable for you to visit this college, we should give you a most cordial welcome, and show you all that we are doing, and especially in the lines of study in which you are particularly interested. Dr. Chas. S. Dolley, our Professor of Natural History and Biology, will present this note, and will take great pleasure in escorting such to the college as may desire to come.

" Very respectfully, your friend,

" EDWARD H. MAGILL,

" *President.*"

SECOND SESSION.

DECEMBER 28, P.M.

President Gilbert in the chair. Thirty-five members present.

Dr. C. A. Oliver opened the afternoon meeting with an illustrated paper on "Color Blindness and a Color Sense Measurer," followed by a discussion by Profs. Martin, Davis, and others.

Prof. Hyatt delivered a paper entitled "A Method of Instructing Large Classes with Specimens."

Prof. H. Newell Martin exhibited several pieces of physiological apparatus recently devised at the Johns Hopkins Biological Laboratory.

Prof. Henry Sewall displayed and explained the working of several pieces of Physiological apparatus lately invented at the University of Michigan.

THIRD SESSION.

DECEMBER 29, A.M.

President Gilbert in the chair. Thirty-eight members present.

The morning was mainly devoted to the two addresses by Prof. Henry S. Williams on methods of instruction in General Geology, and by Prof. William M. Davis on instruction in Geological Investigation.

Joseph P. Lesley, LL.D., whose name was recommended to the Society by the Executive Committee, for honorary membership, was unanimously elected.

It was moved by Prof. Davis that the Executive Committee be requested to consider an amendment to Article II., Section 1, of the Constitution, to the end that election to membership shall be accomplished by the Executive Committee; and that a report on such amendment be made at the meeting a year hence.

Carried.

The following communications were read by the Secretary : —

“ AMERICAN PHILOSOPHICAL SOCIETY, PHILADELPHIA,
“ 104 SOUTH FIFTH STREET, Dec. 18, 1886.

“ Prof. S. F. CLARKE, *Secretary, American Society Naturalists* : —

“ DEAR SIR, — I have the honor to present to you the enclosed resolution, and to state that the hall of the Society is open daily from 10 A.M. to 1 P.M.

“ Your obedient servant,

“ HENRY PHILLIPS, JR.,
“ *Secretary.*”

“ AMERICAN PHILOSOPHICAL SOCIETY, PHILADELPHIA,
“ 104 SOUTH FIFTH STREET, Dec. 17, 1886.

“ At a meeting of the Society held this evening, it was resolved that this Society should invite the American Society of Naturalists to visit the hall of the American Philosophical Society during its forthcoming meeting.

“ Clipped from the minutes.

“ HENRY PHILLIPS, JR.,
“ *Secretary.*”

FOURTH SESSION.

DECEMBER 29, P.M.

President Gilbert in the chair. Forty-nine members present.
Addresses were given as follows : —

1. What sort of Botanical Investigation is needed in this Country, and how can it best be promoted? By Prof. William G. Farlow.
2. The Best Methods of Teaching Biology in Colleges. By Prof. H. Newell Martin.
3. Biological Instruction in Universities. By Prof. C. O. Whitman.

It was moved and seconded that the Executive Committee be requested to take such action as may be desirable to secure the

publication of the papers read to-day in some of the scientific or educational journals of the country.

The Committee on Nominations made the following report to the Society :—

“ PHILADELPHIA, PA., Dec. 29, 1886..

“ *To the President and Members of the American Society of Naturalists :—*

“ Your Nominating Committee beg to report that it has the honor to make the following nominations for officers for the ensuing fiscal year :—

“ *For President.* — Dr. HARRISON ALLEN, of Philadelphia.

“ *For Vice-Presidents.* — Prof. EDW. D. COPE, of Philadelphia.

Prof. GEORGE L. GOODALE, of Harvard University, Cambridge, Mass.

Prof. HENRY SHALER WILLIAMS, of Cornell University, Ithaca, N.Y.

“ *For Secretary.* — Prof. SAMUEL F. CLARKE, of Williams College, Williamstown, Mass.

“ *For Treasurer.* — Prof. WILLIAM T. SEDGWICK, of the Mass. Inst. Tech., Boston, Mass.

“ *For Members at Large of the Executive Committee.* — Prof.

HENRY F. OSBORN, of Princeton College, Princeton, N.J.

Dr. C. V. RILEY, Entomologist of the U.S. Dept. of Agriculture, Washington, D.C.

“ Very respectfully,

“ W. G. FARLOW.

“ ANGELO HEILPRIN.

“ W. M. DAVIS.

“ W. J. McGEE.

“ HORACE JAYNE.”

The annual dinner, given at the rooms of the University Club on the evening of the twenty-ninth, was a thoroughly enjoyable occasion to the thirty members who were present.

FIFTH SESSION.

DECEMBER 30, A.M.

The nominations for officers were unanimously elected.

The names of Mr. C. M. Allen, Dr. L. W. Fox, Mr. Samuel Garman, Prof. Emily L. Gregory, Mr. F. A. Hill, Prof. F. S. Lee, and Mr. C. S. Prosser having been recommended to the Society for membership by the Executive Committee, were unanimously elected.

The committee appointed at the last meeting to consider the question of establishing a Bureau of Information made the following report:—

“To the President and Members of the American Society of Naturalists:—

“ Your committee appointed to consider the desirability of establishing a Bureau of Information, though not entirely agreed, present the following report: —

“ 1. That we recommend to the Society the appointment of a committee whose duty it shall be to organize a bureau of information to serve as a medium of communication between those who are seeking for scientific assistants, teachers, etc., and those qualified to be considered as candidates for such posts.

“ 2. That we further suggest that this committee is in no case to endorse candidates, or make themselves in any way responsible, or seek for places, or otherwise act as an employment bureau, except in so far as the passive duty of furnishing information and a means of registration is concerned.

“ 3. That as a means to this end the committee be instructed to keep on file the names of those desiring to be employed as teachers of science, or of assistants, etc., together with such diplomas, letters of recommendation, etc., as may be sent them by the persons whose names have been accepted, or a list of the same, at their discretion.

“ 4. That the committee have discretionary powers as to the means to be employed, and books to be kept, but that they shall keep an accurate record of names, and as far as practicable of

places or positions obtained through their interposition, and full accounts of money received and paid, which last shall be accounted for in the Treasurer's annual report to the Society.

" 5. That the committee shall have also discretionary power in the selection of names, so as to enable them to reject the names of cranks and illiterate or obviously unsuitable persons.

" 6. It is, however, not the intention of the committee to ask the Society to set up a high standard of excellence, but simply to furnish a medium between two classes of people. Thus all names having any reasonable claims should be accepted and filed, only those being rejected whose pretensions are obviously without proper foundations. The burden of selection beyond this point should be thrown upon the judgment of the employers. The great difficulty of obtaining the lower classes of assistants and workers, as well as the higher, should be considered by the committee when defining the classes of names considered admissible to their lists.

" 7. In order to start this enterprise an appropriation of —— dollars should be made in order to advertise, print, and distribute a sufficient number of circulars, and for paper, postage, etc.

" 8. It is further suggested that, after the first year, it would become expedient to limit the expenses of the bureau to an income derived by assessments from the persons benefited. For this purpose the committee is instructed to charge an entry fee of one dollar and an inquiry fee of two dollars; the entry fee to be paid by candidates after their names are accepted, but before they are entered on the books or files of the committee, and the inquiry fee before any would-be employer is allowed to consult the lists or receive other information with regard to candidates. Perhaps better to make a somewhat higher entry fee, and no inquiry fee.

" Signed,

" ALPHÉUS HYATT,
" WILLIAM NORTH RICE, }
" G. BROWN GOODE, } Committee."

After much discussion the whole matter was referred to the Executive Committee.

Papers were read as follows:—

By Mr. HENRY E. SUMMERS, of Cornell University:

1. On the Decalcification of the Skull by Nitric Acid to facilitate the Removal of the Brain. By Professor Wilder and Mr. Summers.

Notes and Querics from the Anatomical Laboratory of Cornell University.

2. Tilton's Liquid, a Preservative.
3. The Determination of Combined Aquatic and Aerial Respiration.
4. New Use of Slips in Scientific Correspondence.
5. A Wheel for Slip Notes.
6. Black Paper-muslin for Blackboard Use.
7. Mounting of Human Skeleton in Normal Mammalian Position.
8. A Truck and Jar Protector, for Museums.
9. Strengthening and Purifying Alcohol.

Prof. C. H. HITCHCOCK. The International Geological Congress.

Prof. J. PLAYFAIR McMURRICH. A Useful Form of Mould for Class Study.

It was suggested by Prof. William B. Scott that the special topic for the next annual meeting be The Teaching of Science in Schools.

Prof. WILLIAM T. SEDGWICK exhibited a new Form of Diagram, clips to be used with the same; a new Form of Microscope Slide Boxes, and a very convenient Form of Dialyzer.

SIXTII SESSION.

DECEMBER 30, P.M.

BIOLOGICAL DEPARTMENT OF THE UNIVERSITY OF PENNSYLVANIA.

President Gilbert in the chair. Thirty-three members present. The names of Prof. H. C. Bumpus, Prof. Frederick Tucker-

man, Prof. C. S. Dolley, and Dr. Hobart Hare were unanimously elected to membership, they having been duly recommended by the Executive Committee.

Papers were read by:—

Prof. JOHN A. RYDER. Description of a New Microtome.

Dr. HORACE F. JAYNE. A Method of Lecture Illustration.

Prof. C. S. DOLLEY. A Dissecting Pad.

Dr. HARRISON ALLEN.

Prof. R. RAMSEY WRIGHT. A communication from Professor Wright was read by the Secretary, giving descriptions of new models of Invertebrata and Cryptogams.

Through the courtesy of Dr. Meybridge the Society enjoyed the pleasure of seeing a large and very interesting and instructive collection of serial stereoptic views of various animals in motion.

A unanimous vote of thanks was given to Dr. Meybridge for his very valuable entertainment.

THE TREASURER'S REPORT.

The Treasurer of the American Society of Naturalists begs leave to make the following report, Dec. 28, 1886:—

	Balance as per last report, Dec. 28, 1885 . . .	\$334 27
	Dues received during 1886	352 02
Feb. 9.	Payment made to C. S. Minot, Sec'y Ex.	\$86 31
Sept. 27.	Payment made to S. F. Clarke, Sec'y Ex.	89 46
" "	Payment made for collection of draft	50
Dec. 28.	Stationery for Treasurer's use . . .	5 50
" "	Stamps " " " . .	10 00
" "	Balance on hand	494 52
		<hr/>
		\$686 29 \$686 29

Respectfully submitted,

CHARLES A. ASHBURNER,

Treasurer.

The Auditing Committee made the following report:—

“PHILADELPHIA, Dec. 28, 1886.

“We, the Auditing Committee of the American Society of Naturalists, have examined the account of the Treasurer, and find it to be correct, and that the sum now on hand is four hundred and ninety-four dollars and fifty-two cents (\$494.52).

“J. T. ROTHROCK.

“J. S. DILLER.”

It was moved to accept and adopt this report. Seconded and carried.

The following resolution was seconded and carried:—

“Resolved. That the thanks of the Society are due and are most cordially tendered to the Local Committee for their services, so kindly rendered and so promotive of the comfort and convenience of the members of the Society; to the Engineers' Club of Philadelphia and to the authorities of the University of Pennsylvania, for the use of the rooms occupied for the meetings of the Society; to the University Club, for the use of the rooms for the annual dinner; and to the Philadelphia Academy of Science, the American Philosophical Society, and the Union League of Philadelphia, for the privileges so courteously offered to the members of the Society.”

It was also moved and carried that this meeting has been more than usually successful and instructive, and this result has been largely owing to the issue of a circular calling the attention of the members to subjects of special interest which were to be debated. This same policy, if continued in the future, is likely to produce similar results. The undersigned respectfully recommends that the following subjects be debated at the next meeting: Studies needed for the preparation of students for advanced courses in Geology, Palaeontology, Zoölogy, Botany, and Biology.

ALPHEUS HYATT.

At the close of the meeting the Society was very delightfully entertained with a banquet prepared by their most cordial hosts,

the gentlemen of the Biological Department of the University of Pennsylvania.

Appended is a nearly complete list of the members present:—

- Mr. C. A. ASHBURNER, State Geological Survey of Pennsylvania.
Prof. SAMUEL F. CLARKE, Williams College.
“ EDWARD D. COPE, Philadelphia, Penn.
“ WILLIAM M. DAVIS, Harvard University.
Mr. J. S. DILLER, U.S. Geological Survey.
Prof. GEORGE DIMMOCK, Cambridge, Mass.
“ C. S. DOLLEY, University of Pennsylvania.
“ WILLIAM B. DWIGHT, Vassar College.
Mr. JAMES H. EMERTON, New Haven, Conn.
Prof. BEN K. EMERSON, Amherst, Mass.
“ WILLIAM G. FARLOW, Harvard University.
President G. K. GILBERT, U.S. Geological Survey.
Prof. ANGELO HEILPIN, Academy of Natural Science, Phila.
Prof. C. H. HITCHCOCK, Dartmouth College.
“ W. H. HOWELL, Johns Hopkins University.
“ ALPHEUS HYATT, Boston Society of Natural History.
Dr. HORACE JAYNE, University of Pennsylvania.
Prof. JOSEPH LEIDY, University of Pennsylvania.
Mr. W. J. McGEE, U.S. Geological Survey.
Prof. GEORGE MACLOSKIE, Princeton.
“ J. PLAYFAIR McMURRICH, Haverford College.
“ H. NEWELL MARTIN, Johns Hopkins University.
“ W. H. NILES, Massachusetts Institute of Technology.
Dr. C. A. OLIVER, Philadelphia, Penn.
Prof. H. F. OSBORN, Princeton.
Dr. A. C. PEALE, U.S. Geological Survey.
Dr. EDWARD T. REICHERT, University of Pennsylvania.
Prof. WILLIAM NORTH RICE, Wesleyan University.
Dr. C. V. RILEY, U.S. Dept. of Agriculture.
Prof. J. T. ROTHRICK, University of Pennsylvania.
“ JOHN A. RYDER, University of Pennsylvania.
“ WILLIAM B. SCOTT, Princeton.
“ WILLIAM T. SEDGWICK, Massachusetts Institute of Technology.

Prof. HENRY A. SEWALL, University of Michigan.

" BENJAMIN SHARP, Academy of Natural Sciences, Philadelphia.

Mr. C. D. WALCOTT, U.S. Geological Survey.

Prof. C. O. WHITMAN, Director, Lake Laboratory, Milwaukee, Wis.

" HENRY S. WILLIAMS, Cornell University.

" EDMUND B. WILSON, Bryn Mawr College.

The Society adjourned at 4.45 P.M.

Signed,

SAMUEL F. CLARKE,

Secretary.



RECORDS
OF THE
AMERICAN SOCIETY
OF
NATURALISTS.

VOLUME I.,
PART FIFTH.

BOSTON:
PUBLISHED BY THE SECRETARY.
1888.

R E C O R D S .

LIST OF OFFICERS FOR 1888.

President, HARRISON ALLEN.

Vice-Presidents, { GEORGE L. GOODALE,
HENRY S. WILLIAMS,
HENRY F. OSBORN.

Secretary, SAMUEL F. CLARKE.

Treasurer, WILLIAM T. SEDGWICK.

*Members of the Executive Committee elected from the
Society at Large.*

RICHARD RATHBUN, CHARLES V. RILEY,
GEORGE H. WILLIAMS.

LIST OF HONORARY MEMBERS.

*DANA, JAMES D., Ph.D., LL.D., Mineralogy, Zoölogy, Geology.

Professor of Geology, Yale College.

Yale College, New Haven, Conn.

LEIDY, JOSEPH, M.D., LL.D.

Professor of Anatomy in the University of Pennsylvania, and
Director of the Biological Department, President of the
Faculty of the Wagner Free Institute, and President of the
Academy of Natural Sciences, Philadelphia.

LESLEY, J. P., A.M., LL.D. Geology.

State Geologist of Pennsylvania.

907 Walnut street, Philadelphia, Penn.

MARSH, O. C., Ph.D., LL.D. Palæontology.

Professor of Palæontology, Yale University.

8 Peabody Museum, New Haven, Conn.

LIST OF MEMBERS.

[An asterisk designates original membership.]

- ALLEN, C. M. Physics.
Wyoming Seminary, Kingston, Penn.
- *ALLEN, HARRISON, M.D. Comparative Anatomy.
117 South 20th street, Philadelphia, Penn.
- ALLIS, EDWARD P., JR. Biology.
Associate Editor of the *Journal of Morphology*.
Milwaukee, Wisconsin.
- *ASHBURNER, CHARLES A., M.S., C.E. Geology.
Penn Building, Pittsburgh, Penn.
- BARROWS, WALTER B., B.S. Ornithology.
Curator of the Museum of Wesleyan University.
Middletown, Conn.
- BAUR, GEORGE, Ph.D. Vertebrate Palaeontology.
Assistant in Osteology, Yale University.
Peabody Museum, New Haven, Conn.
- BENEDICT, JAMES E., A.M. Natural History.
Naturalist U.S. Fish Commission, Str. "Albatross."
Smithsonian Institution, Washington, D.C.
- *BICKMORE, ALBERT S.
Secretary and Professor in charge of Department of Public
Instruction of the American Museum of Natural History.
American Museum, Central Park, N.Y.
- BOLTON, H. CARRINGTON, A.M., Ph.D. Mineralogy, Chemistry.
University Club, New York City.
- *BOWDITCH, HENRY P., A.M., M.D. Physiology.
Professor of Physiology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- BREWER, WILLIAM H., Ph.D. Biology.
Professor of Agriculture, Yale University.
246 Orange street, New Haven, Conn.

- *BRITTON, N. L., E.M., Ph.D. Botany and Geology.
 Assistant in Geology and Botany, School of Mines, Columbia
 College, and Botanist, Geological Survey of New Jersey.
School of Mines, Columbia College, N.Y.
- BRUSH, G. J. Mineralogy.
 Director, Sheffield Scientific School.
New Haven, Conn.
- BUMPUS, H. C., Ph.B. Zoölogy.
 Professor of Biology and Geology, Olivet College.
Olivet, Michigan.
- CALL, R. ELLSWORTH. Tertiary Palæontology, Mollusca.
 Assistant Professor in Geology and Zoölogy, University of
 Missouri.
Columbia, Missouri.
- CAMPBELL, JOHN P., B.A. Physiology.
 Fellow by courtesy of the Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- CHITTENDEN, R. H., Ph.D. Physiology.
 Professor of Physiological Chemistry, Yale University.
83 Trumbull street, New Haven, Conn.
- CLARK, WILLIAM B., Ph.D. Palæontology.
 Instructor in Palæontology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- CLARKE, SAMUEL F., Ph.B., Ph.D. Zoölogy.
 Professor of Natural History, Williams College.
Williamstown, Mass.
- *COPE, EDWARD D. Vertebrate, Palæontology and Zoölogy.
2102 Pine street, Philadelphia, Penn.
- *COUES, ELLIOTT, A.M., M.D., Ph.D. Vertebrates, Bibliog-
 raphy.
Smithsonian Institution, Washington, D.C.
- *CROSBY, W. O., S.B. Geology.
 Assistant Professor of Mineralogy and Lithology, Massachu-
 setts Institute of Technology.
Institute of Technology, Boston, Mass.
- DALL, WILLIAM HEALEY. Mollusca, Palæontology.
 Palæontologist U.S. Geological Survey, Honorary Curator,
 Department of Mollusks, U.S. National Museum.
Smithsonian Institution, Washington, D.C.

- DANA, EDWARD S., Ph.D.
 Assistant Professor of Natural Philosophy, Yale University.
111 Grove street, New Haven, Conn.
- *DAVIS, WILLIAM M., S.B., M.E. Geology, Geography, and Meteorology.
 Assistant Professor of Physical Geography, Harvard College.
Museum of Comparative Zoölogy, Cambridge, Mass.
- *DEWEY, FREDERIC P., Ph.B. Metallurgy.
 Curator of Metallurgy, U.S. National Museum.
National Museum, Washington, D.C.
- *DILLER, J. S., S.B. Petrography and Geology.
 Assistant Geologist in charge of Petrographic Laboratory.
U.S. Geological Survey, Washington, D.C.
- *DIMMOCK, GEORGE, Ph.D. Zoölogy.
Cambridge, Mass.
- DOLLEY, CHARLES S. Biology.
 Professor of General Biology in the University of Pennsylvania; Professor of Natural History in Swarthmore College.
University of Pennsylvania, Biological Department.
- *DONALDSON, HENRY H., Ph.D. Physiology.
 Associate in Psychology, Johns Hopkins University.
Johns Hopkins University, Baltimore, M.D.
- *DUDLEY, WILLIAM R., M.S. Cryptogamic Botany.
 Assistant Professor of Cryptogamic Botany, Cornell University.
Cornell University, Ithaca, N.Y.
- *DUTTON, C. E. Geology.
 Captain of Ordnance, U.S.A.
U.S. Geological Survey, Washington, D.C.
- DWIGHT, WILLIAM B., B.A., M.A., Ph.B. Palaeontology.
 Professor of Natural History and Curator of the Museum, Vassar College.
Vassar College, Poughkeepsie, N.Y.
- DWIGHT, THOMAS, A.M., M.D. Anatomy.
 Parkman Professor of Anatomy, Harvard Medical School.
Harvard Medical School, Boston, Mass.

- *EMERSON, B. K., Ph.D. Geology and Mineralogy.
 Professor of Geology, Amherst College.
Amherst, Mass.
- *EMERTON, JAMES H. Zoölogy.
 Assistant in Zoölogy, Yale College.
Yale College, New Haven, Conn.
- *EMMONS, S. F. Geology.
 Geologist of the U.S. Geological Survey.
Geological Survey, Washington, D. C.
- ERNST, HAROLD C., A.M., M.D. Bacteriology.
 Demonstrator of Bacteriology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- *FARLOW, WM. G., A.B., M.D. Botany.
 Professor of Cryptogamic Botany, Harvard College.
Harvard College, Cambridge, Mass.
- FERNALD, C. H., A.M., Ph.D. Microlepidoptera.
 Professor of Zoölogy, Mass. Agricultural College.
Amherst, Mass.
- FOX, L. WEBSTER, M.D. Anatomy and Physiology.
 Clinical Assistant, Jefferson Medical College Hospital,
 Ophthalmic Surgeon to Germantown Hospital.
1304 Walnut street, Philadelphia, Penn.
- FRAZER, PERSIFOR. Geology and Chemistry.
 Docteur ès-Sciences Naturelles (Université de France). Professor of Chemistry, Franklin Institute, Philadelphia.
201 S. Fifth street, Philadelphia, Penn.
- *GAGE, SIMON H., S.B. Vertebrate Morphology and Physiology.
 Assistant Professor of Physiology and Lecturer on Microscopical Technology, Cornell University.
Cornell University, Ithaca, N. Y.
- *GARDINER, EDWARD G., B.S., Ph.D. Zoölogy.
 Instructor in Biology, Massachusetts Institute of Technology.
289 Marlborough street, Boston, Mass.
- GARMAN, SAMUEL. Zoölogy.
 Assistant, Museum Comp. Zoölogy.
Cambridge, Mass.
- *GERRISH, FREDERIC HENRY, A.M., M.D. Anatomy.
 Professor of Anatomy, Bowdoin College.
675 Congress street, Portland, Me.

- ***GILBERT, G. K.** Geology.
Geologist of the U.S. Geological Survey.
Geological Survey, Washington, D.C.
- GOODALE, GEORGE L., A.M., M.D.** Botany.
Professor of Botany. Harvard College.
Harvard College, Cambridge, Mass.
- ***GOODE, G. BROWN, A.M., Ph.D.** Zoölogy.
Assistant Secretary of the Smithsonian Institution in charge
of the U.S. National Museum.
Smithsonian Institution, Washington, D.C.
- GRATACAP, L. P., M.A., Ph.B.** Mineralogy and Geology.
Assistant Curator of Geology, American Museum of Natural
History, New York.
77th street and 8th avenue, New York, N.Y.
- ***GREENLEAF, R. W., A.M., M.D.** Botany.
241 Boylston street, Boston, Mass.
- GREGORY, EMILY L., Ph.D.** Botany.
Associate in Botany, Bryn Mawr College.
Bryn Mawr, Penn.
- HAGUE, ARNOLD.** Geology and Petrography.
Geologist, U.S. Geological Survey.
Geological Survey, Washington, D.C.
- HALL, JAMES, M.S., A.M., M.D., LL.D.** Geology, Palæontology.
State Geologist of New York, Director of the State Museum
of Natural History.
State Museum, Albany, N.Y.
- HARE, HOBART AMORY, B.Sc., M.D.** Physiology.
Demonstrator of Experimental Therapeutics in the Medical
Department, and Instructor in Physiology in the Biologi-
cal Department of The University of Pennsylvania.
117 South Twenty-second street, Philadelphia, Penn.
- ***HEILPRIN, ANGELO.** Palæontology and Geology.
Professor of Invertebrate Palæontology at, and Curator-in-
charge of, the Academy of Natural Sciences of Phila-
delphia, and Professor of Geology at the Wagner Free
Institute of Science.
Academy of Natural Sciences, Philadelphia, Penn.

- ***HENSHAW, SAMUEL.** Zoölogy.
 Assistant Boston Society of Natural History.
Boston Society of Natural History, Boston, Mass.
- ***HILL, FRANK A.** Geology.
 Geologist in charge Anthracite District. State Survey of Pennsylvania.
208 South Centre street, Pottsville, Penn.
- HILL, ROBERT T.** Palæontology.
 Assistant Palæontologist, U.S. Geological Survey.
Washington, D.C.
- ***HITCHCOCK, C. H., Ph.D.** Geology.
 Professor of Geology and Mineralogy, Dartmouth College.
Hanover, N.H.
- HITCHCOCK, ROMYN.** Fresh-water Algæ.
 Acting Curator, U.S. National Museum.
Smithsonian Institution, Washington, D.C.
- ***HOLDER, J. B., M.D.** Zoölogy.
 Curator of Invertebrate Zoölogy and of Fishes and Reptiles.
 Am. Museum Nat. History.
American Museum, Central Park, N.Y.
- HOWELL, WILLIAM H., B.A., Ph.D.** Physiology.
 Associate in Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- HUNT, T. STERRY, A.M., LL.D.** Mineralogy and Geology.
Montreal, Canada.
- ***HYATT, ALPHEUS, S.B.** Palæontology and Zoölogy.
 Curator of the Boston Society of Natural History, and assistant in Museum of Comparative Zoölogy, at Cambridge, Mass.
Boston Society of Natural History, Boston, Mass.
- IDDINGS, JOSEPH P., Ph.B.** Geology and Lithology.
 Assistant Geologist, U.S. Geological Survey.
Washington, D.C.
- JASTROW, JOSEPH, Ph.D.** Physiology.
Johns Hopkins University, Baltimore, Md.

- JAYNE, HORACE, M.D. Vertebrata.
 Professor of Vertebrate Morphology, University of Pennsylvania.
Biological Department, University of Pennsylvania, Philadelphia, Penn.
- JEFFRIES, J. AMORY, A.B., M.D. Anatomy.
91 Newbury street, Boston, Mass.
- JORDAN, DAVID STARR. Biology.
 President of Indiana University.
Bloomington, Ind.
- JULIEN, ALEXIS A., Ph.D. Biology and Petrography.
 Instructor in Biology and Microscopy, School of Mines,
 Columbia College.
School of Mines, Columbia College, New York, N.Y.
- *KIDDER, J. H., A.M., M.D. Chemist.
Smithsonian Institution, Washington, D.C.
- *KINGSLEY, J. S., D.Sc. Zoölogy.
 Editor of "American Naturalist." Professor of Zoölogy in
 Indiana University.
University of Indiana, Bloomington, Ind.
- LEE, F. S., Ph.D., A.M. Physiology.
 Associate in Biology, Bryn Mawr College.
Bryn Mawr, Penn.
- *LEE, LESLIE A., Ph.D. Geology and Biology.
 Professor of Geology and Biology, Bowdoin College.
Brunswick, Me.
- LEE, THOMAS G., M.D. Histology.
 Lecturer on Normal Histology.
Yale University, New Haven, Conn.
- *LEWIS, H. CARVILL, A.M. Geology and Mineralogy.
 Professor of Mineralogy, Academy of Natural Sciences of
 Philadelphia, and Professor of Geology at Haverford College,
 Haverford, Penn.
Academy of Natural Sciences, Philadelphia, Penn.
- *LIBBEY, WILLIAM, Jr., A.M., D.Sc. Histology.
 Professor of Physical Geography, Princeton College, and Director of the E. M. Museum of Geology and Archaeology.
Princeton, N.J.

- LUCAS, FREDERIC A. Avian Osteology.
Assistant Curator, Department of Comparative Anatomy,
U.S. National Museum.
Washington, D.C.
- *MACLOSKIE, GEORGE, D.Sc., LL.D. Biology.
Professor of Biology, Princeton College.
Princeton, N.J.
- *MARCOU, JOHN B. Geology.
Assistant Geologist, U.S. Geological Survey.
1518 H street, N.W., Washington, D.C.
- MARK, EDWARD L. Biology.
Hersey Professor of Anatomy, Harvard University.
21 North avenue, Cambridge, Mass.
- *MARSHALL, JOHN P., A.M. Mineralogy and Geology.
Professor of Mineralogy and Geology, Tufts College.
College Hill, Mass.
- *MARTIN, H. NEWELL, A.M., M.D., D.Sc., F.R.S. Physiology.
Professor of Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- *McGEE, W. J. Geology.
Geologist, U.S. Geological Survey.
U.S. Geological Survey, Washington, D.C.
- McMURRICH, J. PLAYFAIR, M.A., Ph.D. Animal Morphology.
Professor of Biology, Haverford College.
Haverford College, Penn.
- *MEEHAN, THOMAS.
Botanist to the Pennsylvania State Board of Agriculture,
Vice-President Academy of Natural Sciences, Philadelphia.
Germantown, Penn.
- *MERRIAM, C. HART, M.D. Mammals and Birds.
Chief of Division of Economic Ornithology and Mammalogy
of the U.S. Department of Agriculture and Secretary of
the American Ornithologists' Union.
Washington, D.C.
- *MERRILL, F. J. H., Ph.B. Geology.
Fellow in Geology, Columbia College.
New York, N.Y.

- PENFIELD, SAMUEL L., Ph.B.** Mineralogy.
 Instructor in Mineralogy, Yale University.
Peabody Museum, New Haven, Conn.
- *PILLSBURY, J. H.** Biology.
 Professor of Biology, Smith College.
Northampton, Mass.
- *POWELL, J. W., Ph.D., LL.D.** Anthropology and Geology.
 Director of the U.S. Geological Survey, and Director of the
 Bureau of Ethnology, Smithsonian Institution.
Geological Survey, Washington, D.C.
- *PRENTISS, A. N., M.S.** Botany.
 Professor of Botany, Horticulture, and Arboriculture, Cornell
 University.
Cornell University, Ithaca, N.Y.
- PROSSER, CHARLES S., M.S.** Geology and Palæontology.
 Instructor in Palæontology, Cornell University.
Ithaca, N.Y.
- *PUTNAM, FREDERICK W.** Archæology and Ethnology.
 Peabody Professor of American Archæology and Ethnology,
 Harvard University; Curator of the Peabody Museum of
 Archæology and Ethnology, in connection with Harvard
 University; Permanent Secretary of the American Associa-
 tion for the Advancement of Science; Massachusetts
 State Commissioner on Inland Fisheries; and President
 Boston Society of Natural History.
Peabody Museum, Cambridge, Mass.
- *RATHBUN, RICHARD, M.S.** Invertebrates.
 Curator, Dep't of Marine Invertebrates, National Museum.
U.S. National Museum, Washington, D.C.
- REICHART, EDWARD T., M.D.** Physiology.
 Professor of Physiology, University of Pennsylvania.
University of Pennsylvania, Philadelphia, Penn.
- *RICE, WILLIAM NORTH, Ph.D., LL.D.** Geology.
 Professor of Geology, Wesleyan University.
Middletown, Conn.
- *RILEY, C. V., A.M., Ph.D.** Entomology, Mycology.
 Entomologist of the U.S. Department of Agriculture, and
 Curator of Insects, U.S. National Museum.
1700 13th street, N.W., Washington, D.C.

- *ROTHROCK, J. T., M.D., B.S. Botany.
Professor of Botany, University of Pennsylvania.
West Chester, Chester Co., Penn.
- *RUSSELL, ISRAEL C. Geology.
U.S. Geological Survey, Washington, D.C.
- *SARGENT, CHARLES S. Botany.
Professor of Arboriculture, Harvard University, and Director of the Arnold Arboretum.
Brookline, Mass.
- *SCOTT, WILLIAM B., Ph.D. Animal Morphology.
Professor of Geology and Palæontology, Princeton College.
Princeton, N.J.
- *SCUDDER, S. H., A.M., S.B. Entomology and Palæontology.
Palæontologist, U.S. Geological Survey.
Cambridge, Mass.
- *SEDWICK, WILLIAM T., Ph.D. Biology.
Associate Professor of Biology, Massachusetts Institute of Technology.
Massachusetts Institute of Technology, Boston, Mass.
- SEWALL, HENRY, B.Sc., Ph.D. Physiology.
Professor of Physiology, University of Michigan.
Ann Arbor, Mich.
- *SHAKESPEARE, E. O., A.M., M.D. Histology.
Ophthalmic Surgeon and Pathologist to Philadelphia (Charity) Hospital.
1336 Spruce street, *Philadelphia, Penn.*
- SHALER, N. S., A.M., S.D. Palæontology.
Professor of Geology, Harvard College, and Geologist U.S. Geological Survey.
Cambridge, Mass.
- *SHARP, BENJAMIN, M.D., Ph.D. Animal Morphology.
Professor of Invertebrate Zoölogy, Academy of Natural Sciences of Philadelphia.
Academy of Natural Sciences, Philadelphia, Penn.
- *SHUFELDT, R. W., M.D., C.M.Z.S. Anatomy of Vertebrates.
Captain, Medical Department, U.S.A.
Care of Smithsonian Institution, Washington, D.C.

- SMITH, JOHN B.** Entomology.
 Assistant Curator of Entomology, U.S. National Museum.
National Museum, Washington, D.C.
- SMITH, ROBERT MEADE, A.M., M.D.** Physiology.
 Professor of Comparative Physiology, University of Pennsylvania.
332 South Twenty-first street, Philadelphia, Penn.
- ***SMITH, SIDNEY I., Ph.D.** Biology.
 Professor of Comparative Anatomy, Yale College.
147 Whalley avenue, New Haven, Conn.
- STEJNEGER, LEONHARD, Ph.D.** Ornithology and Mammalogy.
 Assistant Curator, Ornithological Department, U.S. National Museum.
U.S. National Museum, Washington, D.C.
- ***STEVENSON, J. J., Ph.D.** Geology.
 Professor, University of the City of New York.
University, Washington square, New York, N.Y.
- THACHER, JAMES K., M.D., B.A.** Zoölogy.
 Professor of Physiology and Clinical Medicine, Yale University.
206 Crown street, New Haven, Conn.
- TILTON, JOHN L., A.B.** Biology.
 Assistant in Natural History, Wesleyan University.
Middletown, Conn.
- ***TRUE, FREDERICK W., M.S.** Vertebrates.
 Curator of Mammals, U.S. National Museum.
National Museum, Washington, D.C.
- ***TRYON, G. W., Jr.** Conchology.
 Conservator of the Conchological Department of the Academy of Natural Sciences of Philadelphia.
Academy of Natural Sciences, Philadelphia, Penn.
- TUCKERMAN, FREDERICK, M.D., B.Sc.** Anatomy.
 Professor of Anatomy, Amherst College.
Amherst, Mass.
- ***TYLER, J. M., A.B.** Zoölogy.
 Professor of Zoölogy and Botany, Amherst College.
Amherst, Mass.

- ***VAN VLECK, B. H., S.B.** Biology.
Instructor in Biology and Physiology in Boston University.
Boston Society of Natural History, Boston, Mass.
- VERRILL, A. E., M.A.** Zoölogy.
Professor of Zoölogy, Yale University.
86 Whalley avenue, New Haven, Conn.
- ***WADSWORTH, M. E., A.M., Ph.D.** Mineralogy, Petrography,
and Geology.
Director of the Michigan Mining School and Professor of
Mineralogy and Geology.
Michigan Mining School, Houghton, Mich.
- ***WALCOTT, C. D.** Palæontology and Geology.
Palæontologist, U.S. Geological Survey, and Hon. Curator
of Invertebrate Palæozoic Fossils, U.S. National Museum.
National Museum, Washington, D.C.
- ***WARD, HENRY A., A.M.** Natural Science.
Head of Ward's Natural Science Establishment.
No. 16 to 26 College avenue, Rochester, N.Y.
- ***WARREN, J. W., A.B., M.D.** Physiology.
Instructor in Physiology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- ***WHITFIELD, R. P., M.A.** Palæontology.
(Late Professor at Troy, N.Y.), Curator of Geology and
Conchology, American Museum of Natural History.
*American Museum of Natural History, 77th street and
8th avenue, New York, N.Y.*
- ***WHITMAN, C. O., A.M., Ph.D.** Animal Morphology.
Editor Journal of Morphology and Director of Lake
Laboratory.
Milwaukee, Wis.
- ***WHITNEY, W. F., M.D.** Pathology.
Curator of the Museum of the Harvard Medical School.
Harvard Medical School, Boston, Mass.
- ***WILDER, BURT G., B.S., M.D.** Vertebrate Morphology,
Professor of Physiology, Comparative Anatomy, and Zoölogy,
and Curator of Vertebrate Museum, Cornell University.
Cornell University, Ithaca, N.Y.

- WILLIAMS, GEORGE HUNTINGTON, A.B., Ph.D. Mineralogy.
Associate Professor of Mineralogy and Petrography, Johns Hopkins University.
Johns Hopkins University, Baltimore.
- *WILLIAMS, HENRY S., Ph.D. Geology and Palæontology.
Professor of Geology and Palæontology, Cornell University,
and Assistant Geologist, U.S. Geological Survey.
Cornell University, Ithaca, N.Y.
- WILLISTON, SAMUEL W., M.D., Ph.D. Anatomy.
Assistant Professor of Anatomy, Yale University.
New Haven, Conn.
- *WILSON, EDMUND B., Ph.B., Ph.D. Animal Morphology.
Professor of Biology, Bryn Mawr College, Penn.
Bryn Mawr, Penn.
- WILSON, W. P., B.S., D.Sc. Botany.
Professor of Physiological Botany, Department of Biology,
University of Pennsylvania.
Westchester, Penn.
- WINCHELL, ALEXANDER, LL.D. Geology.
Professor of Geology and Palæontology, University of Michigan.
Ann Arbor, Michigan.
- WOLFF, JOHN E., A.B. Petrography.
Instructor in Petrography, Harvard University.
Cambridge, Mass.
- *WRIGHT, R. RAMSAY, M.A., B.Sc. Zoölogy.
Professor of Natural History, University College, Toronto,
Canada.
University College, Toronto, Canada.
- *YARROW, H. C., M.D., Acting Asst.-Surg. U.S.A. Herpetology.
Curator, Department of Reptiles, U.S. National Museum.
814 17th street, N.W., Washington, D.C.

SIXTH MEETING, AT NEW HAVEN, CONN.**DECEMBER 27, 1887.****LECTURE ROOM OF THE PEABODY MUSEUM.****MORNING SESSION.**

President Allen in the Chair. Thirty-four members present.
The Secretary's report was called for and read, as follows:—

REPORT OF THE SECRETARY.*To the Society:—*

GENTLEMEN,—It is a matter of congratulation that our number varies but slightly, notwithstanding that this year, for the first time, Section 2 of Article II. of the Constitution has been enforced. Our number is now nearly one hundred and fifty. The standard of admission was raised by the Executive Committee at the last meeting, and that committee, in their desire to keep the standard of admission at the highest, fairly reflect, I believe, the general opinion and wish of the Society.

The change in the length of the meeting last year from two to three days met with such a degree of success as evidenced by the large attendance, and the twenty-eight papers read, that the same arrangement has been adopted this year, and will probably be continued.

It is thought that the assignment of the geological and biological papers to the first and last days, respectively, with the special topic on the second day, will prove satisfactory; for, in the first place, it gives each member an opportunity to hear just what may be of interest to him, and that alone, and, in the second place, it necessitates but two days' attendance to all interested in but Geology or Biology. That some specialization of this kind is essential is shown, among other things, by the fact that a new society is soon to be organized for Physiologists solely.

I would call your attention to the fact that the Secretary has

lately received a request for a copy of our constitution, which is to be used as a basis in the organizing of a new society this week at Indianapolis. The objects of the new society are to be identical or very similar to those of this one, and it is to receive members from Indiana, Illinois, Ohio, Michigan, Wisconsin, and Minnesota. In connection with this, let me remind you of Article VII. of our Constitution.

"ARTICLE VII.

"AFFILIATED SOCIETIES.

"It shall be the policy of this Society, by correspondence and otherwise, to encourage the formation and coöperate in the work of societies of similar name and objects in other parts of the country."

Death, for the first time, has this year been among us, taking from our list of Honorary Members the name of Spencer F. Baird, and from our list of regular members, Francis V. Hayden.

The addresses by Professors Davis, Farlow, Whitman, and H. F. Williams, delivered at the Philadelphia meeting, 1886, have since been published, and one thousand copies of each are ready for distribution among the schools, and wherever else the Society may direct.

Respectfully submitted,

SAMUEL F. CLARKE,

Secretary.

DECEMBER 28, 1887.

The report was accepted.

The Treasurer made the following report to the Society:—

REPORT OF THE TREASURER.

The Treasurer of the American Society of Naturalists begs leave to make the following report:—

December 27, 1887.

Balance as per last report	\$494 52
Dues received during 1887	<u>314 00</u>

<i>Amount carried forward,</i>	\$808 52
--------------------------------	----------

<i>Amount brought forward,</i>	<i>\$808 52</i>
Feb. 4. Payment made S. F. Clarke, Secretary	\$25 65
9. Cash-box	1 75
Apr. 4. Assessment notices and receipt book	11 00
Oct. 22. Clerical work	9 00
25. J. P. Lippincott & Co.	17 00
Dec. 27. Postage	7 44
Balance on hand	<u>736 68</u>
	<u><u>\$808 52</u></u>

Respectfully submitted,

W. T. SEDGWICK,

Treasurer.

The name of Professor O. C. Marsh, recommended to the Society for honorary membership by the Executive Committee, was unanimously elected.

The following names were recommended for regular membership and were unanimously elected : —

Mr. E. P. Allis, Jr.,
Dr. George Baur,
Professor William H. Brewer,
Mr. John P. Campbell,
Professor R. H. Chittenden,
Dr. Wm. B. Clark,
Professor E. S. Dana,
Dr. Joseph Jastrow,
President D. S. Jordan,
Professor Thomas G. Lee,
Mr. Frederic A. Lucas,
Professor Edward L. Mark,
Mr. Samuel L. Penfield,
Mr. John B. Smith,
Professor James K. Thacher,
Mr. Robert T. Hill,
Mr. John L. Tilton,
Professor A. E. Verrill,
Dr. Samuel W. Williston,
Professor W. P. Wilson,
Professor Alexander Winchell,
Mr. John E. Wolff.

The presidential address on "The Inconstant in Biology," was then delivered, Professor E. S. Morse in the chair.

The President appointed the following committee to nominate officers for the fiscal year: —

Professor H. N. Martin,
" S. H. Gage,
" S. I. Smith,
" B. K. Emerson,
" J. P. McMurrich.

It was voted that the President appoint a committee to consider the question of publication of papers by the Society.

The following gentlemen constitute that committee: —

Professor H. N. Martin,
" W. T. Sedgwick,
" E. S. Morse.

A paper on " Perfected Wools for Detection of Sub-normal Color Perceptions," with illustrations, by Dr. C. A. Oliver, was communicated by the President.

Professor S. H. Gage, of Cornell, described a new method of " Injection of the Thoracic Duct."

The morning session concluded with a descriptive paper by Mr. James H. Emerton, on " A Method of Life-size Model-making of the Larger Animals."

SECOND SESSION.

TUESDAY, DECEMBER 27, P.M.

Professor E. S. Morse read an exhaustive paper on " Museum Cases in Europe," to which he added numerous crayon sketches of all the styles of cases in Europe and most of their contents.

Professor H. Newell Martin exhibited some newly devised physiological apparatus for getting repeated " making " shocks, or " breaking " shocks, as may be desired.

Methods of Cutting Serial Brain and Spinal Cord Sections were described and illustrated by Professor Henry F. Osborn.

A new Automatic Microtome, to be worked by hand or by a motor, was exhibited and described by Professor Charles S. Minot.

"The Preparation of Serial Sections" was the subject of a second paper by Professor Minot.

A Lecture-room Illustration of Variation under Domestication and in Nature, by Professor Samuel F. Clarke, ended the list of papers for the day.

It was moved and carried that the Records be published as soon after the annual meeting as possible.

THIRD SESSION.

WEDNESDAY, DECEMBER 28, A.M.

The special topic for the day was "SCIENCE-TEACHING IN THE SCHOOLS."

The first paper was by Professor Ramsey Wright, of Toronto.

The second paper was by Professor Alexander Winchell, of Ann Arbor. General discussion of these papers occupied most of the remaining time of this session.

The Nominating Committee made the following report: —

"NEW HAVEN, Dec. 28, 1887.

"The Committee on Nominations recommend that officers for the ensuing year be elected as follows: —

"*President.* — HARRISON ALLEN, University of Pennsylvania.

"*Vice-Presidents.* — GEORGE L. GOODALE, Harvard University.

HENRY S. WILLIAMS, Cornell University.

HENRY F. OSBORN, Princeton College.

"*Secretary.* — SAMUEL F. CLARKE, Williams College.

"*Treasurer.* — WILLIAM T. SEDGWICK, Mass. Institute Technology.

"Members of Executive Committee from Society at Large.—

RICHARD RATHBUN, National Museum.

GEORGE H. WILLIAMS, Johns Hopkins University.

" Signed.

" H. NEWELL MARTIN,

" *Chairman.*"

The report was accepted by the Society.

It was moved that a committee be appointed by the Chair to consider the propriety of adopting a resolution to be presented to Congress, requesting the repeal of laws imposing a duty on scientific books and apparatus, the committee to report to-morrow.

The President appointed Professors Cope, Goode, and Rice.

FOURTH SESSION.

WEDNESDAY, DECEMBER 28, P.M.

The afternoon meeting was opened by Professor Macloskie, of Princeton, with a paper on the special topic for the day.

Prof. William North Rice, of Wesleyan University, delivered the last address on "Science-teaching in the Schools." This was followed by general discussion of the afternoon programme.

It was moved by Professor S. F. Clarke that a committee of five be appointed to develop a scheme of instruction in Natural Science to be recommended to the schools, and to suggest methods of action for this Society which shall tend to establish more and better science-teaching in the earlier part of the educational course, say, from the age of seven to the time of entering college. The committee to report at the next annual meeting.

The motion was seconded and carried.

The President appointed on that committee:—

Professor Samuel F. Clarke,

" William North Rice,

" William G. Farlow,

" George Macloskie,

" C. O. Whitman.

It was moved, seconded, and carried, that the Executive Committee be requested to consider the advisability of so changing the Constitution, or By-laws, as to secure the sending to every member of the Society notice of the nominations for honorary membership before the election takes place.

It was moved, seconded, and voted, that the Executive Committee be requested to consider the advisability of so changing the Constitution as to reduce the annual dues from two dollars to one.

At seven o'clock, between thirty and forty sat down to the Annual Dinner, at the New Haven House, which proved to be a most enjoyable occasion.

FIFTH SESSION.

TUESDAY, DECEMBER 29, A.M.

The first paper of the day was by Professor James D. Dana, on "The Volcano of Kilauea."

A paper on "A Simple Method of Measuring the Thickness of Inclined Strata," by Mr. C. D. Walcott, was read by Professor H. S. Williams.

Professor William B. Dwight exhibited and explained the working of "Improved Machinery and Appliances for cutting Sections of Rock and Fossils in any desired Planes."

The following resolution was brought before the Society by Professor — : —

"*Resolved*, That the American Society of Naturalists send to the editors of "The Journal of Morphology" their congratulations on the work which they have undertaken, and that the sum of \$60 (sixty dollars) be appropriated from the funds of the Society for the purchase of ten copies of the first volume, and —

"*Resolved*, That a committee of three be appointed by the Chair to decide upon the best manner of distributing the copies

purchased, with a view to securing to the Journal a wider circulation."

The above was voted. The President appointed on this committee Professors E. L. Mark, W. T. Sedgwick, A. Hyatt. The Publication Committee submitted the following report:—

"The Committee on the Publication of Papers read before the Society reports that the publication by the Society of such papers is undesirable.

"The committee is of opinion that any valuable communication can readily obtain publication through some of the existing journals.

"H. NEWELL MARTIN,
"Chairman of Committee."

This report was accepted, and it was voted that the Society deems it unadvisable to undertake at present any particular system for the publication of papers.

SIXTH SESSION.

THURSDAY, DECEMBER 29, P.M.

A paper on "Instruction in Mineralogy and Structural Geology in the Massachusetts Institute of Technology," by Professor W. O. Crosby, was communicated by Professor William T. Sedgwick.

Professor George H. Williams read a paper on "The Educational Value of Micropetrography."

A new American Lithological Microscope was displayed and described by Professor George H. Williams.

The Auditing Committee presented the following report, which was accepted:—

"DECEMBER 29, 1887.

"The undersigned, members of the committee appointed to audit the accounts of the Treasurer, report that they have examined the account for 1886-87 and find it correct.

"Signed,

"J. P. McMURRICH,
"H. NEWELL MARTIN,
"HENRY F. OSBORNE."

It was moved, seconded, and carried, that the Treasurer be and hereby is instructed to pay to the Secretary the sum of \$25 as some expression of the Society's appreciation of his long-continued and devoted services.

It was announced by the Executive Committee that a very cordial invitation had been received from Professor Martin, and accepted, to hold the next annual meeting in Baltimore. Professor C. H. Hitchcock presented the following resolution:—

"*Resolved*, That the American Society of Naturalists cordially join the American Association for the Advancement of Science, the American Philosophical Society, and other scientific and educational institutions, in cordially inviting the International Congress of Geologists to hold their next meeting — the one following the London meeting of 1888 — at some convenient locality in the United States."

It was moved and carried.

The following resolution was seconded and received a unanimous vote:—

"*Resolved*, That the thanks of the Society are due and are most cordially tendered to the Trustees of the Peabody Museum for the use of the rooms occupied for the meeting of the Society, and for the many kindly courtesies which contributed so much to the comfort and convenience of the members and to the success of the meeting."

The committee appointed to consider the propriety of adopting a resolution to be presented to Congress, requesting the repeal of laws imposing a duty on scientific books and apparatus, presented the following resolution:—

"WHEREAS, The cause of education in science is retarded by the restrictions placed by Congress on the importation of scientific books and apparatus; whereas we believe that advance in the arts and industries depends on the development of science and is impeded by the before-mentioned import duties, and that all restrictions on education and scientific research are unworthy of enlightened government; whereas the scientific books published abroad are absolutely essential to students and investigators, and are but rarely duplicated in this country; whereas the value of scientific apparatus is in nearly all cases dependent on the individuality of the maker; and whereas colleges and incorporated institutions are now permitted to import apparatus duty free, while private investigators, usually less able to afford expense, are obliged to pay duty, therefore

"Be it Resolved, That hereby requests the representatives of in the Congress of the United States to use all possible efforts to have placed on the free list, books pertaining to the physical, natural, and medical sciences, and apparatus intended for purposes of scientific research or of education; and further be it

"Resolved, That a copy of these preambles and resolutions be forwarded to each member of Congress."

It was

"Resolved, That a copy of the above resolution be forwarded to the Universities and Colleges of the United States by the Secretary, with a recommendation that it be adopted by them at an early date, and that information of the same be communicated to Professor Eastman, United States Naval Observatory, Washington, D.C."

Signed,

E. D. COPE,
Chairman.

The resolution was seconded and carried.

The Society adjourned at 5 P.M.

SAMUEL F. CLARKE,
Secretary.



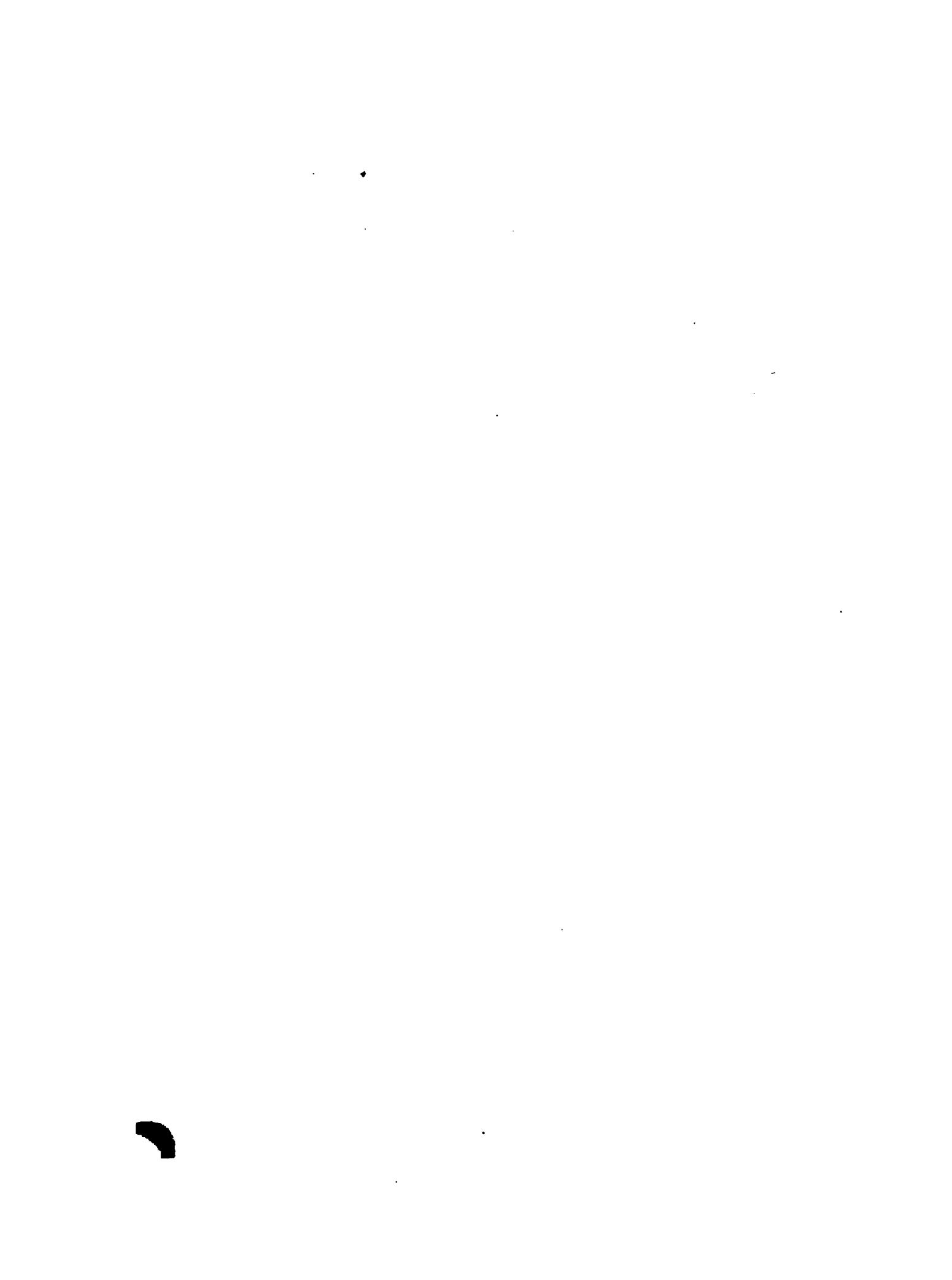


R E C O R D S
OF THE
AMERICAN SOCIETY
OF
NATURALISTS.

VOLUME I.,
PART SIXTH.

BOSTON:
PUBLISHED BY THE SECRETARY.
1889.

R E C O R D S.



LIST OF OFFICERS FOR 1889.

President, **GEORGE L. GOODALE.**
Vice-Presidents, **{ HENRY S. WILLIAMS,**
HENRY F. OSBORN,
G. BROWN GOODE.
Secretary, **HENRY H. DONALDSON.**
Treasurer, **WILLIAM T. SEDGWICK.**

*Members of the Executive Committee elected from the
Society at Large.*

GEORGE H. WILLIAMS, J. PLAYFAIR McMURRICH.

LIST OF HONORARY MEMBERS.

- ***DANA, JAMES D.**, Ph.D., LL.D., Mineralogy, Zoölogy, Geology.
Professor of Geology, Yale University.
Yale University, New Haven, Conn.
- LEIDY, JOSEPH**, M.D., LL.D.
Professor of Anatomy in the University of Pennsylvania, and
Director of the Biological Department, President of the
Faculty of the Wagner Free Institute, and President of the
Academy of Natural Sciences, Philadelphia.
- LESLEY, J. P.**, A.M., LL.D. Geology.
State Geologist of Pennsylvania.
907 Walnut street, Philadelphia, Penn.
- MARSH, O. C.**, Ph.D., LL.D. Palæontology.
Professor of Palæontology, Yale University.
8 Peabody Museum, New Haven, Conn.

LIST OF MEMBERS.

[An asterisk designates original membership.]

ALLEN, C. M.	Physics.
<i>Wyoming Seminary, Kingston, Penn.</i>	
*ALLEN, HARRISON, M.D.	Comparative Anatomy.
<i>117 South 20th street, Philadelphia, Penn.</i>	
ALLIS, EDWARD P., Jr.	Biology.
Associate Editor of the Journal of Morphology.	
<i>Milwaukee, Wis.</i>	
ANDREWS, E. A., Ph.D.	Biology.
Instructor in Osteology, Johns Hopkins University.	
<i>Johns Hopkins University, Baltimore, Md.</i>	
*ASHBURNER, CHARLES A., M.S., C.E.	Geology.
<i>Penn Building, Pittsburgh, Penn.</i>	
BARROWS, WALTER B., B.S.	Ornithology.
Department of Agriculture.	
<i>Washington, D.C.</i>	
BARTON, B. W., M.D.	Botany.
<i>Baltimore, Md.</i>	
BAUR, GEORGE, Ph.D.	Vertebrate Palaeontology.
Assistant in Osteology, Yale University.	
<i>Peabody Museum, New Haven, Conn.</i>	
BENEDICT, JAMES E., A.M.	Natural History.
Naturalist.	
<i>147 Dakota avenue, St. Paul, Minn.</i>	
*BICKMORE, ALBERT S.	
Secretary and Professor in charge of Department of Public Instruction of the American Museum of Natural History.	
<i>American Museum, Central Park, N.Y.</i>	
BOLTON, H. CARRINGTON, A.M., Ph.D.	Mineralogy, Chemistry.
<i>University Club, New York City.</i>	
*BOWDITCH, HENRY P., A.M., M.D.	Physiology.
Professor of Physiology, Harvard Medical School.	
<i>Harvard Medical School, Boston, Mass.</i>	

- BREWER, WILLIAM H., Ph.D. Biology.
 Professor of Agriculture, Yale University.
246 Orange street, New Haven, Conn.
- BRUSH, G. J. Mineralogy.
 Director, Sheffield Scientific School.
New Haven, Conn.
- BUMPUS, H. C., Ph.B. Zoölogy.
 Professor of Biology and Geology, Olivet College.
Olivet, Mich.
- CALL, R. ELLSWORTH. Tertiary Palæontology, Mollusca.
 Instructor in Natural Science, West Des Moines High
 School.
621 Tenth street, Des Moines, Ia.
- CAMPBELL, JOHN P., B.A. Physiology.
 Professor of Biology, University of Georgia.
- CHITTENDEN, R. H., Ph.D. Physiology.
 Professor of Physiological Chemistry, Yale University.
83 Trumbull street, New Haven, Conn.
- CLARK, WILLIAM B., Ph.D. Palæontology.
 Instructor in Palæontology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- CLARKE, SAMUEL F., Ph.B., Ph.D. Zoölogy.
 Professor of Natural History, Williams College.
Williamstown, Mass.
- CONN, H. W. Assistant Professor of Biology, Wesleyan University.
Middletown, Conn.
- *COPE, EDWARD D. Vertebrate Palæontology and Zoölogy.
2102 Pine street, Philadelphia, Penn.
- *COUES, ELLIOTT, A.M., M.D., Ph.D. Vertebrates, Bibliog-
 raphy.
Smithsonian Institution, Washington, D.C.
- *CROSBY, W. O., S.B. Geology.
 Assistant Professor of Mineralogy and Lithology, Massachu-
 setts Institute of Technology.
Institute of Technology, Boston, Mass.
- DALL, WILLIAM HEALEY. Mollusca, Palæontology.
 Palæontologist U.S. Geological Survey, Honorary Curator
 Department of Mollusks, U.S. National Museum.
Smithsonian Institution, Washington, D.C.

- DANA, EDWARD S., Ph.D.**
 Assistant Professor of Natural Philosophy, Yale University.
111 Grove street, New Haven, Conn.
- *DAVIS, WILLIAM M., S.B., M.E.** Geology, Geography, and Meteorology.
 Assistant Professor of Physical Geography, Harvard University.
Museum of Comparative Zoölogy, Cambridge, Mass.
- *DEWEY, FREDERIC P., Ph.B.** Metallurgy.
 Curator of Metallurgy, U.S. National Museum.
National Museum, Washington, D.C.
- *DILLER, J. S., S.B.** Petrography and Geology.
 Assistant Geologist in charge of Petrographic Laboratory.
U.S. Geological Survey, Washington, D.C.
- *DIMMOCK, GEORGE, Ph.D.** Zoölogy.
Cambridge, Mass.
- DOLLEY, CHARLES S.** Biology.
 Professor of General Biology in the University of Pennsylvania; Professor of Natural History in Swarthmore College.
University of Pennsylvania, Biological Department.
- *DONALDSON, HENRY H., Ph.D.** Physiology.
 Assistant Professor of Neurology.
Clark University, Worcester, Mass.
- *DUDLEY, WILLIAM R., M.S.** Cryptogamic Botany.
 Assistant Professor of Cryptogamic Botany, Cornell University.
Cornell University, Ithaca, N.Y.
- *DUTTON, C. E.** Geology.
 Captain of Ordnance, U.S.A.
U.S. Geological Survey, Washington, D.C.
- DWIGHT, THOMAS, A.M., M.D.** Anatomy.
 Parkman Professor of Anatomy, Harvard Medical School.
235 Beacon street, Boston, Mass.
- DWIGHT, WILLIAM B., B.A., M.A., Ph.B.** Palæontology.
 Professor of Natural History and Curator of the Museum, Vassar College.
Vassar College, Poughkeepsie, N.Y.
- *EMERSON, B. K., Ph.D.** Geology and Mineralogy.
 Professor of Geology, Amherst College.
Amherst, Mass.

- *EMERTON, JAMES II. Zoölogy.
11 St. James avenue, Boston, Mass.
- *EMMONS, S. F. Geology.
 Geologist of the U.S. Geological Survey.
Geological Survey, Washington, D. C.
- ERNST, HAROLD C., A.M., M.D. Bacteriology.
 Demonstrator of Bacteriology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- *FARLOW, WM. G., A.B., M.D. Botany.
 Professor of Cryptogamic Botany, Harvard University.
Harvard University, Cambridge, Mass.
- FERNALD, C. H., A.M., Ph.D. Microlepidoptera.
 Professor of Zoölogy, Mass. Agricultural College.
Amherst, Mass.
- FEWKES, J. WALTER. Secretary, Boston Society of Natural History ; Assistant, Mu-
 seum of Comparative Zoölogy.
Museum of Comparative Zoölogy, Cambridge, Mass.
- FOX, L. WEBSTER, M.D. Anatomy and Physiology.
 Clinical Assistant, Jefferson Medical College Hospital,
 Ophthalmic Surgeon to Germantown Hospital.
1304 Walnut street, Philadelphia, Penn.
- FRAZER, PERSIFOR. Geology and Chemistry.
 Docteur ès-Sciences Naturelles (Université de France).
 Professor of Chemistry, Franklin Institute, Philadelphia.
Room 1042, Drexel Building, Philadelphia, Penn.
- *GAGE, SIMON H., S.B. Vertebrate Morphology and Physiology.
 Assistant Professor of Physiology and Lecturer on Micro-
 scopical Technology, Cornell University.
Cornell University, Ithaca, N. Y.
- GANONG, WM. FRANCIS. Zoölogy.
Cambridge, Mass.
- *GARDINER, EDWARD G., B.S., Ph.D. Zoölogy.
 Instructor in Biology, Massachusetts Institute of Technology.
289 Marlborough street, Boston, Mass.
- GARMAN, SAMUEL. Zoölogy.
 Assistant, Museum Comp. Zoölogy.
Cambridge, Mass.
- *GERRISH, FREDERIC HENRY, A.M., M.D. Anatomy.
 Professor of Anatomy, Bowdoin College.
675 Congress street, Portland, Me.

- ***GILBERT, G. K.** Geology.
 Geologist of the U.S. Geological Survey.
P.O. Box 591, Washington, D.C.
- GOODALE, GEORGE L., A.M., M.D.** Botany.
 Professor of Botany, Harvard University.
Harvard University, Cambridge, Mass.
- ***GOODE, G. BROWN, A M., Ph.D.** Zoölogy.
 Assistant Secretary of the Smithsonian Institution in charge
 of the U.S. National Museum.
Smithsonian Institution, Washington, D.C.
- GRATACAP, L. P., M.A., Ph.B.** Mineralogy and Geology.
 Assistant Curator of Geology, American Museum of Natural
 History, New York.
77th street and 8th avenue, New York, N.Y.
- ***GREENLEAF, R. W., A.M., M.D.** Botany.
241 Boylston street, Boston, Mass.
- GREGORY, EMILY L., Ph.D.** Botany.
- HAGUE, ARNOLD.** Geology and Petrography.
 Geologist, U.S. Geological Survey.
Geological Survey, Washington, D.C.
- HALL, JAMES, M.S., A.M., M.D., LL.D.** Geology, Palæontology.
 State Geologist of New York, Director of the State Museum
 of Natural History.
State Museum, Albany, N.Y.
- HARE, HOBART AMORY, B.Sc., M.D.** Physiology.
 Demonstrator of Experimental Therapeutics in the Medical
 Department, and Instructor in Physiology in the Biologi-
 cal Department of the University of Pennsylvania.
117 South Twenty-second street, Philadelphia, Penn.
- ***HEILPRIN, ANGELO.** Palæontology and Geology.
 Professor of Invertebrate Palæontology at, and Curator-in-
 charge of, the Academy of Natural Sciences of Phila-
 delphia, and Professor of Geology at the Wagner Free
 Institute of Science.
Academy of Natural Sciences, Philadelphia, Penn.
- ***HENSHAW, SAMUEL.** Zoölogy.
 Assistant Boston Society of Natural History.
Boston Society of Natural History, Boston, Mass.

- *HILL, FRANK A. Geology.
Geologist in charge Anthracite District, State Survey of Pennsylvania.
208 South Centre street, Pottsville, Penn.
- HILL, ROBERT T. Palæontology.
School of Geology, University of Texas.
Austin, Texas.
- *HITCHCOCK, C. H., Ph.D. Geology.
Professor of Geology and Mineralogy, Dartmouth College.
Hanover, N.H.
- HITCHCOCK, ROMYN. Fresh-water Algæ.
Acting Curator, U.S. National Museum.
Smithsonian Institution, Washington, D.C.
- HOWELL, WILLIAM H., B.A., Ph.D. Physiology.
Associate in Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- HUNT, T. STERRY, A.M., LL.D. Mineralogy and Geology.
Care Mr. James Douglas, Spuyten Duyvil, N.Y.
- *HYATT, ALPHEUS, S.B. Palæontology and Zoölogy.
Curator of the Boston Society of Natural History, and Assistant in Museum of Comparative Zoölogy, at Cambridge, Mass.
Boston Society of Natural History, Boston, Mass.
- IDDINGS, JOSEPH P., Ph.B. Geology and Lithology.
Assistant Geologist, U.S. Geological Survey.
Washington, D.C.
- JASTROW, JOSEPH, Ph.D. Physiology.
Madison, Wis.
- JAYNE, HORACE, M.D. Vertebrata.
Professor of Vertebrate Morphology, University of Pennsylvania.
Biological Department, University of Pennsylvania, Philadelphia, Penn.
- JEFFRIES, J. AMORY, A.B., M.D. Anatomy.
91 Newbury street, Boston, Mass.
- JORDAN, DAVID STARR. Biology.
President of Indiana University.
Bloomington, Ind.
- JULIEN, ALEXIS A., Ph.D. Biology and Petrography.
Instructor in Biology and Microscopy, School of Mines, Columbia College.
School of Mines, Columbia College, New York, N.Y.

- ***KIDDER, J. H., A M., M.D.** **Chemist.**
1606 New Hampshire avenue, Washington, D.C.

***KINGSLEY, J. S., D.Sc.** **Zoölogy.**
Editor of "American Naturalist," Professor of Zoölogy in
Indiana University.
University of Indiana, Bloomington, Ind.

KNOWLTON, FRANK H., M.S. **Botany.**
Assistant Curator U.S. National Museum, Professor of
Botany, Columbian University, Washington, D.C.
U.S. National Museum.

LEE, F. S., Ph.D., A.M. **Physiology.**
Associate in Physiology and Histology, Bryn Mawr College.
Bryn Mawr, Penn.

***LEE, LESLIE A., Ph.D.** **Geology and Biology.**
Professor of Geology and Biology, Bowdoin College.
Brunswick, Me.

LEE, THOMAS G., M.D. **Histology.**
Lectures on Normal Histology.
Yale University, New Haven, Conn.

***LIBBEY, WILLIAM, Jr., A.M., D.Sc.** **Histology.**
Professor of Physical Geography, Princeton College, and Di-
rector of the E. M. Museum of Geology and Archæology.
Princeton, N.J.

LUCAS, FREDERIC A. **Avian Osteology.**
Assistant Curator, Department of Comparative Anatomy,
U.S. National Museum.
Washington, D.C.

***MACCOSKIE, GEORGE, D.Sc., LL.D.** **Biology.**
Professor of Biology, Princeton College.
Princeton, N.J.

***MARCOU, JOHN B.** **Geology.**
Assistant Geologist, U.S. Geological Survey.
1518 H street, N.W., Washington, D.C.

MARK, EDWARD L. **Biology.**
Hersey Professor of Anatomy, Harvard University.
21 North avenue, Cambridge, Mass.

***MARSHALL, John P., A M.** **Mineralogy and Geology.**
Professor of Mineralogy and Geology, Tufts College.
College Hill, Mass.

***MARTIN, H. NEWELL, A.M., M.D., D.Sc., F.R.S.** **Physiology.**
Professor of Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.

- *McGEE, W. J. Geology.
Geologist, U.S. Geological Survey.
U.S. Geological Survey, Washington, D.C.
- McMURRICH, J. PLAYFAIR, M.A., Ph.D. Animal Morphology.
Professor of Biology, Haverford College.
Haverford College, Penn.
- *MEEHAN, THOMAS. Botanist to the Pennsylvania State Board of Agriculture,
Vice-President Academy of Natural Sciences, Philadelphia.
Germantown, Penn.
- *MERRIAM, C. HART, M.D. Mammals and Birds.
Chief of Division of Economic Ornithology and Mammalogy
of the U.S. Department of Agriculture, and Secretary of
the American Ornithologists' Union.
Washington, D.C.
- *MERRILL, F. J. H., Ph.B. Geology.
Fellow in Geology, Columbia College.
New York, N.Y.
- *MERRILL, GEORGE P., M.S. Lithology.
Curator of Lithology and Physical Geology, U.S. National
Museum.
National Museum, Washington, D.C.
- MILLS, T. WESLEY, M.D. Biology.
Professor of Physiology, McGill University.
Montreal, Canada.
- *MINOT, CHARLES SEDGWICK, S.B., S.D. Biology.
Assistant Professor of Embryology and Histology, Harvard
Medical School.
Harvard Medical School, Boston, Mass.
- MIXTER, SAMUEL J., B.S., M.D. Anatomy.
Demonstrator of Anatomy, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- *MORSE, EDWARD S., Ph.D. Anthropology and Zoölogy.
Director of the Peabody Academy of Science, Salem, Mass.
Salem, Mass.
- *NEWBERRY, J. S., M.D., LL.D. Geology.
Professor of Geology, School of Mines, Columbia College.
School of Mines, Columbia College, New York, N.Y.

- *NILES, WILLIAM H., Ph.B., A.M. Physical Geography and
Historical Geology.
Professor of Geology and Geography, Massachusetts Institute of Technology.
Mass. Institute of Technology, Boston, Mass.
- OLIVER, CHARLES A., A.M., M.D. Special Sense Morphology and Physiology.
Ophthalmic Surgeon to St. Mary's Hospital, Philadelphia.
1507 Locust street, Philadelphia, Penn.
- *OSBORN, HENRY FAIRFIELD, Sc.D. Vertebrate Morphology.
Professor of Comparative Anatomy, Princeton College.
Princeton, N.J.
- *PACKARD, A. S., A.M., M.D., Ph.D. Zoölogy.
Professor of Zoölogy and Geology, Brown University.
Brown University, Providence, R.I.
- *PEALE, A. C., A.M., M.D. Geology.
Geologist, U.S. Geological Survey.
Geological Survey, Washington, D.C.
- *PECKHAM, GEORGE W., M.D. Biology.
Teacher of Biology, Milwaukee High School.
Milwaukee, Wis.
- PENFIELD, SAMUEL L., Ph.B. Mineralogy.
Assistant Professor of Mineralogy, Yale University.
Peabody Museum, New Haven, Conn.
- *PILLSBURY, J. H. Biology.
Professor of Biology, Smith College.
Northampton, Mass.
- *POWELL, J. W., Ph.D., LL.D. Anthropology and Geology.
Director of the U.S. Geological Survey, and Director of the Bureau of Ethnology, Smithsonian Institution.
Geological Survey, Washington, D.C.
- *PRENTISS, A. N., M.S. Botany.
Professor of Botany, Horticulture, and Arboriculture, Cornell University.
Cornell University, Ithaca, N.Y.
- PROSSER, CHARLES S., M.S. Geology and Palæontology.
Instructor in Palæontology, Cornell University.
Ithaca, N.Y.

- *PUTNAM, FREDERICK W. Archæology and Ethnology.
 Peabody Professor of American Archæology and Ethnology,
 Harvard University; Curator of the Peabody Museum of
 Archæology and Ethnology, in connection with Harvard
 University; Permanent Secretary of the American Associa-
 tion for the Advancement of Science; Massachusetts
 State Commissioner on Inland Fisheries; and President
 Boston Society of Natural History.
Peabody Museum, Cambridge, Mass.
- *RATHBUN, RICHARD, M.S. Invertebrates.
 Curator Dep't of Marine Invertebrates, National Museum.
U.S. National Museum, Washington, D.C.
- REICHART, EDWARD T., M.D. Physiology.
 Professor of Physiology, University of Pennsylvania.
University of Pennsylvania, Philadelphia, Penn.
- *RICE, WILLIAM NORTH, Ph.D., LL.D. Geology.
 Professor of Geology, Wesleyan University.
Middletown, Conn.
- *RILEY, C. V., A.M., Ph.D. Entomology, Mycology.
 Entomologist of the U.S. Department of Agriculture, and
 Curator of Insects, U.S. National Museum.
1700 13th street, N.W., Washington, D.C.
- *ROTHROCK, J. T., M.D., B.S. Botany.
 Professor of Botany, University of Pennsylvania.
West Chester, Chester Co., Penn.
- *RUSSELL, ISRAEL C. Geology.
U.S. Geological Survey, Washington, D.C.
- *SARGENT, CHARLES S. Botany.
 Professor of Arboriculture, Harvard University, and Direc-
 tor of the Arnold Arboretum.
Brookline, Mass.
- *SCOTT, WILLIAM B., Ph.D. Animal Morphology.
 Professor of Geology and Palæontology, Princeton College.
Princeton, N.J.
- *SCUDDER, S. H., A.M., S.B. Entomology and Palæontology.
 Palæontologist, U.S. Geological Survey.
Cambridge, Mass.
- *SEDGWICK, WILLIAM T., Ph.D. Biology.
 Associate Professor of Biology, Massachusetts Institute of
 Technology.
Massachusetts Institute of Technology, Boston, Mass.

- SEWALL, HENRY, B.Sc., Ph.D.** Physiology.
 Professor of Physiology, University of Michigan.
Ann Arbor, Mich.
- ***SHAKESPEARE, E. O., A.M., M.D.** Histology.
 Ophthalmic Surgeon and Pathologist to Philadelphia
 (Charity) Hospital.
1336 Spruce street, Philadelphia, Penn.
- SHALER, N. S., A.M., S.D.** Palæontology.
 Professor of Geology, Harvard College, and Geologist, U.S.
 Geological Survey.
Cambridge, Mass.
- ***SHARP, BENJAMIN, M.D., Ph.D.** Animal Morphology.
 Professor of Invertebrate Zoölogy, Academy of Natural
 Sciences of Philadelphia.
Academy of Natural Sciences, Philadelphia, Penn.
- ***SHUFELDT, R. W., M.D., C.M.Z.S.** Anatomy of Vertebrates.
 Captain, Medical Department, U.S.A.
Care of Smithsonian Institution, Washington, D.C.
- SMITH, JOHN B.** Entomology.
 Assistant Curator of Entomology, U.S. National Museum.
National Museum, Washington, D.C.
- SMITH, ROBERT MEADE, A.M., M.D.** Physiology.
 Professor of Comparative Physiology, University of Penn-
 sylvania.
332 South Twenty-first street, Philadelphia, Penn.
- ***SMITH, SIDNEY I., Ph.D.** Biology.
 Professor of Comparative Anatomy, Yale University.
147 Whalley avenue, New Haven, Conn.
- THACHER, JAMES K., M.D., B.A.** Zoölogy.
 Professor of Physiology and Clinical Medicine, Yale Uni-
 versity.
206 Crown street, New Haven, Conn.
- TILTON, JOHN L., A.B.** Biology.
 Assistant in Natural History, Wesleyan University.
Indianola, Ia.
- ***TRUE, FREDERICK W., M.S.** Vertebrates.
 Curator of Mammals, U.S. National Museum.
National Museum, Washington, D.C.
- TUCKERMAN, FREDERICK, M.D., B.Sc.** Anatomy.
 Professor of Anatomy, Amherst College.
Amherst, Mass.

- TUTTLE, ALBERT H.** Biology.
Professor of Biology, University of Virginia.
- ***TYLER, J. M., A.B.** Zoölogy.
Professor of Zoölogy and Botany, Amherst College.
Amherst, Mass.
- ***VAN VLECK, B. H., S.B.** Biology.
Instructor in Biology and Physiology in Boston University.
Boston Society of Natural History, Boston, Mass.
- VERRILL, A. E., M.A.** Zoölogy.
Professor of Zoölogy, Yale University.
86 Whalley avenue, New Haven, Conn.
- ***WADSWORTH, M. E., A.M., Ph.D.** Mineralogy, Petrography,
and Geology.
Director of the Michigan Mining School, and Professor of
Mineralogy and Geology.
Michigan Mining School, Houghton, Mich.
- ***WALCOTT, C. D.** Palæontology and Geology.
Palæontologist, U.S. Geological Survey, and Hon. Curator
of Invertebrate Palæozoic Fossils, U.S. National Museum.
National Museum, Washington, D.C.
- ***WARD, HENRY A., A.M.** Natural Science.
Head of Ward's Natural Science Establishment.
No. 16 to 26 College avenue, Rochester, N.Y.
- ***WARREN, J. W., A.B., M.D.** Physiology.
Instructor in Physiology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- WATASE, S., B.S.** Biology.
Fellow in Morphology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- WHITE, CHARLES D., B.S.** Paleobotany and Geology.
Assistant Palæontologist, U.S. Geological Survey.
U.S. National Museum, Washington, D.C.
- ***WHITFIELD, R. P., M.A.** Palæontology.
(Late Professor at Troy, N.Y.), Curator of Geology and
Conchology, American Museum of Natural History.
*American Museum of Natural History, 77th street and
8th avenue, New York, N.Y.*
- ***WHITMAN, C. O., A.M., Ph.D.** Animal Morphology.
Editor Journal of Morphology, and Director of Lake
Laboratory; Director of the Marine Biological Labora-
tory, Woods Hole, Mass.
Milwaukee, Wis.

- *WHITNEY, W. F., M.D. Pathology.
Curator of the Museum of the Harvard Medical School.
Harvard Medical School, Boston, Mass.
- *WILDER, BURT G., B.S., M.D. Vertebrate Morphology.
Professor of Physiology, Comparative Anatomy, and Zoölogy,
and Curator of Vertebrate Museum, Cornell University.
Cornell University, Ithaca, N.Y.
- WILLIAMS, GEORGE HUNTINGTON, A.B., Ph.D. Mineralogy.
Associate Professor of Mineralogy and Petrography, Johns
Hopkins University.
Johns Hopkins University, Baltimore.
- *WILLIAMS, HENRY S., Ph.D. Geology and Palæontology.
Professor of Geology and Palæontology, Cornell University,
and Assistant Geologist, U.S. Geological Survey.
Cornell University, Ithaca, N.Y.
- WILLISTON, SAMUEL W., M.D., Ph.D. Anatomy.
Assistant Professor of Anatomy, Yale University.
New Haven, Conn.
- *WILSON, EDMUND B., Ph.B., Ph.D. Animal Morphology.
Professor of Biology, Bryn Mawr College, Penn.
Bryn Mawr, Penn.
- WILSON, W. P., B.S., D.Sc. Botany.
Professor of Physiological Botany, Department of Biology,
University of Pennsylvania.
Westchester, Penn.
- WINCHELL, ALEXANDER, LL.D. Geology.
Professor of Geology and Palæontology, University of Michigan.
Ann Arbor, Mich.
- WOLFF, JOHN E., A.B. Petrography.
Instructor in Petrography, Harvard University.
Cambridge, Mass.
- *WRIGHT, R. RAMSAY, M.A., B.Sc. Zoölogy.
Professor of Natural History, University College, Toronto,
Canada.
University College, Toronto, Canada.
- *YARROW, H. C., M.D., Acting Asst.-Surg., U.S.A. Herpetology.
Curator, Department of Reptiles, U.S. National Museum.
814 17th street, N.W., Washington, D.C.

SEVENTH MEETING AT BALTIMORE, MD.

DEC. 27, 1888.

GENERAL LECTURE-ROOM OF THE PHYSICAL BUILDING, JOHNS HOPKINS UNIVERSITY.

MORNING SESSION.

President Allen in the chair. Twenty-seven members present.
The Treasurer reported to the Society as follows:—

TREASURER'S REPORT, 1888.

AMERICAN SOCIETY OF NATURALISTS.

Income.

Balance as per last report	\$736 68
Dues received during 1888	<u>310 00</u>
	<u>\$1,046 68</u>

Outgo.

1887.	
Dec. 29.	S. F. Clarke, services as per vote
	\$25 00
1888.	
Jan. 3.	Stationery for Treasurer's use .
" 13.	J. P. Lippincott & Co., Print- ing
" 21.	S. F. Clarke, Exp. N. Haven Meeting
Feb. 7.	H. C. Melius, Printing, N. Haven Meeting
" 9.	J. T. Robinson, Printing . .
" 11.	D. Appleton & Co., Printing .
Mar. 3.	Rockwell & Churchill, Rec- ords, 1886
June 29.	Rockwell & Churchill, Rec- ords, 1887
	<u>58 17</u>
	<u>67 75</u>
	<u><u>\$277 37</u></u>
	<u><u>\$1,046 68</u></u>

Amounts carried forward,

<i>Amounts brought forward,</i>	\$277 37	\$1,046 68
Dec. 26. Postage	4 50	
		<hr/>
	\$281 87	
Balance on hand	764 81	
		<hr/>
	\$1,046 68	\$1,046 68

Of which \$60 has been already voted.

Respectfully submitted,

W. T. SEDGWICK,
Treasurer.

BALTIMORE, Dec. 27, 1888.

The presidential address, "On the Study of the Human Cranium, with the Description of a New Craniophore," was then delivered, Prof. W. H. Niles being called to the chair.

The Committee on the "Journal of Morphology" were called upon and made the following report: —

The committee appointed at the New Haven meeting to decide upon the method of distributing the copies of the "Journal of Morphology" purchased by the Society, beg leave to submit the following preliminary report: —

The object of the Society being to increase the circulation of the Journal, it seemed to the committee undesirable to present copies to individuals or to institutions, where subscriptions could be readily procured without such aid. Accordingly, the members of the committee endeavored by personal correspondence with officers representing various institutions to secure subscriptions, or, failing in that, to elicit such information as would guide them in determining what to do with the copies purchased.

As a result of correspondence with upwards of thirty persons, five subscriptions have already been secured, and it is believed that there are several more of those whose attention has been directed to the enterprise who may ultimately aid in its support. Information which will be of value in the proposed distribution has also been received.

Although the committee was of the opinion that the resolution was intended to confer on it the power of presenting the Journal in the name of the Society, no such presentations have as yet been made, and the committee would prefer, before assuming the duty, to have the Society express its wish to that effect, if it so desires.

The committee will also be glad to receive suggestions on the subject from any member of the Society.

A. HYATT (per E. L. M.),
W. T. SEDGWICK,
E. L. MARK, *Chairman.*

The President appointed the following Nominating Committee : —

Prof. B. K. EMERSON,
“ W. H. NILES,
“ H. N. MARTIN,
“ E. B. WILSON,
“ ANGELO HEILPRIN.

The Auditing Committee appointed by the President consisted of

Prof. GEORGE MACLOSKIE,
“ S. I. SMITH,
“ W. H. HOWELL.

AFTERNOON SESSION.

Forty members present.

The Executive Committee recommended to the Society that Article II., Section 2, of the Constitution be amended to read as follows: Section 2. Each member shall pay to the Treasurer an annual assessment of one dollar, which shall be considered due in advance at the annual meeting.

This was moved and carried.

Papers were read by Professor Macloskie : —

1. On an Improved Method of constructing Analytical Keys.
2. On the Mouth Parts of the Mosquito.

Both of which were illustrated, and were discussed by the Society.

The Committee on Science in the Schools, appointed last year, made the following report : —

Two distinct topics were referred to us for consideration : —

1. The plan of work in natural science which the Society should recommend.

2. The methods which the Society should adopt to give effect to its recommendations.

I.

In regard to the first topic, we believe the following propositions fairly formulate the views which are held by the members of the Society, and which the Society should use its influence to diffuse: —

1. Instruction in Natural Science should commence in the lowest grades of the primary schools, and should continue throughout the curriculum.

2. In the lower grades, the instruction should be chiefly by means of object-lessons; and the aim should be to awaken and guide the curiosity of the child in regard to natural phenomena, rather than to present systematized bodies of fact and doctrine.

3. More systematic instruction in the Natural Sciences should be given in the high schools.

4. While the Sciences can be more extensively pursued in the English course in the high schools than is practicable in the classical course, it is exceedingly undesirable that scientific study should be entirely omitted during the four years of the high-school course by students preparing for college.

5. An elementary (but genuine and practical) acquaintance with some one or more departments of Natural Science should be required for admission to college.

Believing that the propositions stated above will command general acceptance, we are aware that there must be difference of opinion in regard to details, and that the precise subjects to be introduced into the curriculum must vary somewhat with the circumstances of different localities. We offer the following, not as necessarily the best scheme, but as a reasonable and practical scheme which may at least serve to illustrate the general principles which we have formulated: —

In the primary schools and in the lower grades of the grammar schools we would recommend that the study of plants and animals should be the main part of the scientific work. The botanical instructions should commence with such simple exercises as drawing and describing different forms of leaves, and should gradually advance to the easier and more conspicuous flowers, and later to

the more obscure and difficult forms of flowers, the fruits, and seeds.

The zoölogical instruction in the lower schools should not attempt a systematic survey of the whole animal kingdom, but attention should be directed chiefly to the most familiar animals, and to those which the pupils can see alive. The common domesticated mammals should first be studied, and later the birds, the lower vertebrates, the insects, crustacea, and mollusks. While the range of zoölogical instruction must be limited as regards the number of forms studied, those few familiar forms should be so compared with each other as to give the pupils, very early, some conception of the main lines of biological study, — morphology, physiology, taxonomy.

Special prominence should be given to the study of plants and animals which are useful to man in any way; and the teacher may advantageously, from time to time, give familiar talks in regard to useful products of vegetable and animal origin, and the processes of their manufacture.

A most important feature of the scientific instruction in the lower grades should be to encourage the pupils to collect specimens of all sorts of natural objects, and to make those specimens the subject of object-lessons. The curiosity of the children will thereby be rationally cultivated and guided.

The subject of human physiology and hygiene is of so immense practical importance, and so few comparatively of the pupils ever enter the high school, that we regard as desirable some attempt to teach the rudiments of the subject in the grammar, and even in the primary, schools.

We would recommend the introduction of exceedingly rudimentary courses in physics and chemistry in the highest grades of the grammar school.

We would recommend as perhaps the most desirable branches of science to be included in the classical courses in the high school, and to be required for admission to college, physical geography, phænogamic botany, and human physiology. The first is suggested as tending to keep alive in the student's mind a sympathetic acquaintance with nature in its broader aspects; the second, as affording unequalled opportunities for discipline in observation; the third, as affording knowledge of the greatest practical importance.

The rudiments of physics and chemistry, which we propose for

the grammar schools, will enable physical geography and physiology to be intelligently studied in the early years of the high-school course.

For the scholars in the English course in the high school, there will naturally be more advanced and systematic instruction in chemistry, physics, and zoölogy, and also instruction in geology and astronomy. But the classical students may, with propriety, leave these studies until they reach them in the college course. The scientific instruction they will have received in the primary and grammar schools, and the study of the three branches above specified in their high-school course, will be sufficient to preserve that natural and wholesome sympathy with nature, the loss of which is now the main obstacle to the successful study of Natural Science in the colleges.

II.

The methods which the Society should adopt to give effect to its recommendations.

Something, we believe, can be accomplished by making proper representations before some of the leading educational organizations. We would accordingly recommend that a delegate from this Society be appointed to present the subject before each of the following bodies at its next meeting:—

1. The Annual Convocation of the University of the State of New York.
2. The New England Society of College Presidents.
3. The New England Association of College Officers and Preparatory Teachers.
4. The National Educational Association.
5. The American Institute of Learning.
6. The Association of College Presidents of the Middle States.

We recommend that a committee be appointed at this meeting, whose duty shall be to appoint a delegate to each of the above-named organizations, and to arrange with the officers of those organizations to secure a hearing for the delegates. We further recommend that the travelling expenses of such delegates be paid by the Society.

In view of the fact that in most of the States the arrangement

of the school courses of instruction is almost exclusively in the hands of local boards, with very little centralization or supervision, we believe that the prosecution of the movement for the desired reform should enlist the personal effort of every member. Each, in his own neighborhood, should be ready to use his influence with teachers' institutes, boards of education, school committees, and trustees of particular institutions. We believe that the time is ripe for the effort, and that the educational public will welcome the advocacy of the reform.

SAMUEL F. CLARKE,
Chairman.

It was moved by Prof. H. N. Martin that as many copies of this report be printed as the committee shall find use for. Seconded and voted.

Prof. W. T. Sedgwick suggested that the study of mineralogy be recommended in the report, and moved that the whole subject be referred back to the committee, with full power to act in establishing and extending their methods and in increasing their numbers. Seconded and carried.

The Annual Dinner was given Thursday evening at 7.30, and was attended by over thirty members of the Society.

FRIDAY, DECEMBER 28.

BIOLOGICAL LECTURE-ROOM OF THE JOHNS HOPKINS
UNIVERSITY.

MORNING SESSION.

President Allen in the chair. Forty-five members present.

The morning was given to the special topic for this meeting, which was, "How can Laboratory and Lecture-Room Instruction in Biology and Geology be best adapted to developing Mental Independence in the Student, while presenting him with the Facts; especially when the Number of Students is large?"

Addresses were delivered by Professors George L. Goodale, Harvard; Edmund B. Wilson, Bryn Mawr; W. H. Niles, Massachusetts Institute of Technology; George H. Williams, Johns Hopkins.

The following men, recommended by the Executive Committee, were elected to membership in the Society:—

J. WALTER FEWKES,
T. WESLEY MILLS,
CHARLES D. WHITE,
ALBERT H. TUTTLE,
FRANK H. KNOWLTON,
WILLIAM F. GANONG.

Mr. John E. Wolff, of Harvard, exhibited specimens of and described the process of making "Large Bromide Prints for Lecture Illustration in Geology."

The Nominating Committee reported the following list of officers for the ensuing year:—

President. — GEORGE L. GOODALE.
Vice-Presidents. — HENRY S. WILLIAMS,
HENRY F. OSBORN,
G. BROWN GOODE.

Secretary. — HENRY H. DONALDSON.

Treasurer. — WILLIAM T. SEDGWICK.

Members of the Executive Committee at Large. — GEORGE HUNTINGTON WILLIAMS, J. PLAYFAIR McMURRICH.

AFTERNOON SESSION.

DECEMBER 28.

The question of the advisability of changing the character of the Society by making the meetings cover less time, and by introducing only matters of very broad scientific interest, having been referred to the Society by the Executive Committee, came up for discussion.

It was finally decided that, while it may be well to have the meetings cover less than three days, that it will best serve the interests of science to maintain the present character of the Society.

The following men, having been recommended by the Executive Committee, were elected to membership in the Society:—

S. WATASE,
B. W. BARTON,
E. A. ANDREWS.

The nominations presented by the Nominating Committee were elected by the Society.

The following telegram was sent at the request of the Society :—

To Prof. J. J. STEVENSON, Secretary:—

ITHACA, N.Y.

The American Society of Naturalists has voted to leave the selection of the place of the next meeting to the Executive Committee, with the hope that an arrangement may be made by which those interested in the work of both societies may attend both meetings, one year from this time. It is thought probable that such an arrangement will be made with the Physiological Society.

SAMUEL F. CLARKE,
Secretary.

It was moved by Prof. J. M. Tyler that the Society tender its most hearty thanks to the retiring Secretary for his wise and successful efforts in its foundation, and in helping to bring it to its present prosperous condition. Seconded and carried.

The following resolution was offered as a motion by Prof. B. K. Emerson :—

Resolved, That the general principles and lines of work indicated in the report of the Committee on Science Instruction are heartily approved by this Society.

Seconded by Prof. W. M. Davis, and voted by the Society.

The Auditing Committee reported as follows :—

BALTIMORE, Dec. 28, 1888.

The undersigned members of the Committee appointed to audit the accounts of the Treasurer, report that they have examined the accounts for 1887-88, and compared them with vouchers, and found them correct.

GEORGE MACLOSKIE,
S. I. SMITH,
W. H. HOWELL.

Papers were then listened to by the Society :—

By Prof. W. M. DAVIS, on "Geographic Models for Instruction in Physical Geography."

By Prof. E. D. COPE, on "The Evolution of the Elbow-Joint in the Mammalia."

By Dr. E. A. ANDREWS, "Exhibition and Explanation of a Model of the Frog's Cartilaginous Skull."

The thanks of the editors of the "Journal of Morphology" were tendered to the Society by Prof. C. O. Whitman for the resolution of appreciation and congratulation voted to the editors at the last annual meeting.

The following communication was received from the Zoölogical Society of France through Professor Leidy :—

"The Zoölogical Society of France, in a communication addressed to Professor Leidy, of Philadelphia, under date of November 29, announces that it is organizing an International Congress of Zoölogists, to convene about the beginning of August next. It requests the coöperation of working naturalists."

The following was moved, seconded, and received a unanimous vote :—

Resolved, That the thanks of the Society are due, and are most cordially tendered, to the Johns Hopkins University, to the gentlemen of the Local Committee, and to the University Club for their great kindness and courtesy to the members of this Society throughout the time of this annual meeting.

The Society adjourned at 5 o'clock.

SAMUEL F. CLARKE,
Secretary.

R E C O R D S
OF THE
AMERICAN SOCIETY
OF
NATURALISTS.

VOLUME I.,
PART SEVENTH.
— — — —

BOSTON :
PUBLISHED BY THE SECRETARY.
1890.



LIST OF OFFICERS FOR 1890.

President, H. NEWELL MARTIN.
Vice-Presidents, { SAMUEL F. CLARKE,
 Wm. NORTH RICE,
 R. RAMSAY WRIGHT.
Secretary, HENRY H. DONALDSON.
Treasurer, WILLIAM T. SEDGWICK.

*Members of the Executive Committee elected from the
Society at Large.*

Wm. Libbey, Jr., Wm. M. Davis.

LIST OF HONORARY MEMBERS.

***DANA, JAMES** D., Ph.D., LL.D., Mineralogy, Zoölogy, Geology.
 Professor of Geology, Yale University.
Yale University, New Haven, Conn.

LEIDY, JOSEPH, M.D., LL.D.
 Professor of Anatomy in the University of Pennsylvania, and
 Director of the Biological Department, President of the
 Faculty of the Wagner Free Institute, and President of the
 Academy of Natural Sciences, Philadelphia.

LESLEY, J. P., A.M., LL.D. Geology.
 State Geologist of Pennsylvania.
907 Walnut street, Philadelphia, Penn.

MARSH, O. C., Ph.D., LL.D. Palæontology.
 Professor of Palæontology, Yale University.
8 Peabody Museum, New Haven, Conn.

LIST OF MEMBERS.

[An asterisk designates original membership.]

- | | |
|---|--------------------------|
| ALLEN, C. M. | Physics. |
| <i>Pratt Institute, Brooklyn, N.Y.</i> | |
| *ALLEN, HARRISON, M.D. | Comparative Anatomy. |
| <i>1933 Chestnut street, Philadelphia, Penn.</i> | |
| ALLIS, EDWARD P., Jr. | Biology. |
| Associate Editor of the "Journal of Morphology." | |
| <i>Milwaukee, Wis.</i> | |
| ANDREWS, E. A., Ph.D. | Biology. |
| Instructor in Osteology, Johns Hopkins University. | |
| <i>Johns Hopkins University, Baltimore, Md.</i> | |
| BARROWS, WALTER B., B.S. | Ornithology. |
| Department of Agriculture. | |
| <i>Washington, D.C.</i> | |
| BARTON, B. W., M.D. | Botany. |
| <i>Baltimore, Md.</i> | |
| BAUR, GEORGE, Ph.D. | Vertebrate Palæontology. |
| Docent in Comparative Osteology and Palæontology, Clark | |
| <i>University.</i> | |
| <i>Clark University, Worcester, Mass.</i> | |
| *BICKMORE, ALBERT S. | |
| Secretary and Professor in Charge of Department of Public | |
| Instruction of the American Museum of Natural History. | |
| <i>American Museum, Central Park, N.Y.</i> | |
| BOLTON, H. CARRINGTON, A.M., Ph.D. | Mineralogy, Chemistry. |
| <i>University Club, New York City.</i> | |
| *BOWDITCH, HENRY P., A.M., M.D. | Physiology. |
| Professor of Physiology, Harvard Medical School. | |
| <i>Harvard Medical School, Boston, Mass.</i> | |
| BREWER, WILLIAM H., Ph.D. | Biology. |
| Professor of Agriculture, Yale University. | |
| <i>246 Orange street, New Haven, Conn.</i> | |

- BRUSH, G. J.** Mineralogy.
 Director, Sheffield Scientific School.
New Haven, Conn.
- BUMPUS, H. C., Ph.B.** Zoölogy.
 Fellow in Zoölogy, Clark University.
Worcester, Mass.
- CALL, R. ELLSWORTH.** Tertiary Palæontology, Mollusca.
 Instructor in Natural Science, West Des Moines High
 School.
621 Tenth street, Des Moines, Ia.
- CAMPBELL, JOHN P., B.A.** Physiology.
 Professor of Biology, University of Georgia, Athens, Ga.
- CASEY, THOMAS L.** Entomology.
 Captain, U.S. Engineer Corps.
U.S. Army Building, New York, N.Y.
- CHITTENDEN, R. H., Ph.D.** Physiology.
 Professor of Physiological Chemistry, Yale University.
83 Trumbull street, New Haven, Conn.
- CLARK, WILLIAM B., Ph.D.** Palæontology.
 Instructor in Palæontology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- CLARKE, SAMUEL F., Ph.B., Ph.D.** Zoölogy.
 Professor of Natural History, Williams College.
Williamstown, Mass.
- CONN, H. W.**
 Assistant Professor of Biology, Wesleyan University.
Middletown, Conn.
- ***COPE, EDWARD D.** Vertebrate Palæontology and Zoölogy.
2102 Pine street, Philadelphia, Penn.
- ***COUES, ELLIOTT, A.M., M.D., Ph.D.** Vertebrates, Bibliog-
 raphy.
Smithsonian Institution, Washington, D.C.
- ***CROSBY, W. O., S.B.** Geology.
 Assistant Professor of Mineralogy and Lithology, Massachu-
 setts Institute of Technology.
Institute of Technology, Boston, Mass.
- DALL, WILLIAM HEALEY.** Mollusca, Palæontology.
 Palæontologist, U.S. Geological Survey, Honorary Curator,
 Department of Mollusks, U.S. National Museum.
Smithsonian Institution, Washington, D.C.

DANA, EDWARD S., Ph.D.

Assistant Professor of Natural Philosophy, Yale University.
111 Grove street, New Haven, Conn.

***DAVIS, WILLIAM M., S.B., M.E.** Geology, Geography, and Meteorology.

Assistant Professor of Physical Geography, Harvard University.

Museum of Comparative Zoölogy, Cambridge, Mass.

***DEWEY, FREDERIC P., Ph.B.** Metallurgy.
Curator of Metallurgy, U.S. National Museum.

National Museum, Washington, D.C.

***DILLER, J. S., S.B.** Petrography and Geology.
Assistant Geologist in Charge of Petrographic Laboratory.
U.S. Geological Survey, Washington, D.C.

***DIMMOCK, GEORGE, Ph.D.** Zoölogy.
Cambridge, Mass.

DOLLEY, CHARLES S. Biology.
Professor of General Biology in the University of Pennsylvania; Professor of Natural History in Swarthmore College.

University of Pennsylvania, Biological Department.

***DONALDSON, HENRY H., Ph.D..** Physiology.
Assistant Professor of Neurology, Clark University.
Worcester, Mass.

***DUDLEY, WILLIAM R., M.S.** Cryptogamic Botany.
Assistant Professor of Cryptogamic Botany, Cornell University.

Cornell University, Ithaca, N.Y.

***DUTTON, C. E.** Geology.
Captain of Ordnance, U.S.A.

U.S. Geological Survey, Washington, D.C.

DWIGHT, THOMAS, A.M., M.D. Anatomy.
Parkman Professor of Anatomy, Harvard Medical School.
235 Beacon street, Boston, Mass.

DWIGHT, WILLIAM B., B.A., M.A., Ph.B. Palæontology.
Professor of Natural History and Curator of the Museum,
Vassar College.

Vassar College, Poughkeepsie, N.Y.

- *EMERSON, B. K., Ph.D. Geology and Mineralogy.
Professor of Geology, Amherst College.
Amherst, Mass.
- *EMERTON, JAMES II. Zoölogy.
11 St. James avenue, Boston, Mass.
- *EMMONS, S. F. Geology.
Geologist of the U.S. Geological Survey.
Geological Survey, Washington, D.C.
- *ERNST, HAROLD C., A.M., M.D. Bacteriology.
Demonstrator of Bacteriology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- *FARLOW, WM. G., A.B., M.D. Botany.
Professor of Cryptogamic Botany, Harvard University.
Harvard University, Cambridge, Mass.
- FERNALD, C. H., A.M., Ph.D. Microlepidoptera.
Professor of Zoölogy, Mass. Agricultural College.
Amherst, Mass.
- FEWKES, J. WALTER.
Secretary, Boston Society of Natural History; Assistant,
Museum of Comparative Zoölogy.
Museum of Comparative Zoölogy, Cambridge, Mass.
- FOX, L. WEBSTER, M.D. Anatomy and Physiology.
Clinical Assistant, Jefferson Medical College Hospital,
Ophthalmic Surgeon to Germantown Hospital.
1304 Walnut street, Philadelphia, Penn.
- *GAGE, SIMON H., S.B. Vertebrate Morphology and Physiology.
Assistant Professor of Physiology and Lecturer on Micro-
scopical Technology, Cornell University.
Cornell University, Ithaca, N.Y.
- GANONG, WM. FRANCIS. Zoölogy.
646 Cambridge street, Cambridge, Mass.
- *GARDINER, EDWARD G., B.S., Ph.D. Zoölogy.
Instructor in Biology, Massachusetts Institute of Technology.
131 Mt. Vernon street, Boston, Mass.
- GARMAN, SAMUEL. Zoölogy.
Assistant, Museum of Comparative Zoölogy.
Cambridge, Mass.

- ***GERRISH FREDERIC HENRY, A.M., M.D.** Anatomy.
 Professor of Anatomy, Bowdoin College.
675 Congress street, Portland, Me.
- ***GILBERT, G. K.** Geology.
 Geologist of the U.S. Geological Survey.
P.O. Box 591, Washington, D.C.
- GOODALE, GEORGE L., A.M., M.D.** Botany.
 Professor of Botany, Harvard University.
Harvard University, Cambridge, Mass.
- ***GOODE, G. BROWN, A.M., Ph.D.** Zoölogy.
 Assistant Secretary of the Smithsonian Institution in charge
 of the U.S. National Museum.
Smithsonian Institution, Washington, D.C.
- GRATACAP, L. P., M.A., Ph.B.** Mineralogy and Geology.
 Assistant Curator of Geology, American Museum of Natural
 History, New York.
77th street and 8th avenue, New York, N.Y.
- ***GREENLEAF, R. W., A.M., M.D.** Botany.
241 Boylston street, Boston, Mass.
- ***GREGORY, EMILY L., Ph.D.** Botany.
343 Madison avenue, New York, N.Y.
- HAGUE, ARNOLD.** Geology and Petrography.
 Geologist, U.S. Geological Survey.
Geological Survey, Washington, D.C.
- HALL, JAMES M.S., A.M., M.D., LL.D.** Geology, Palæontology.
 State Geologist of New York, Director of the State Museum
 of Natural History.
State Museum, Albany, N.Y.
- HARE, HOBART AMORY, B.Sc., M.D.** Physiology.
 Demonstrator of Experimental Therapeutics in the Medical
 Department, and Instructor in Physiology in the Biologi-
 cal Department of the University of Pennsylvania.
117 South Twenty-second street, Philadelphia, Penn.
- ***HEILPRIN, ANGELO.** Palæontology and Geology.
 Professor of Invertebrate Palæontology at, and Curator-in-
 charge of, the Academy of Natural Sciences of Phila-
 delphia, and Professor of Geology at the Wagner Free
 Institute of Science.
Academy of Natural Sciences, Philadelphia, Penn.

- ***HENSHAW, SAMUEL.** Zoölogy.
 Assistant, Boston Society of Natural History.
Boston Society of Natural History, Boston, Mass.
- ***HILL, FRANK A.** Geology.
 Geologist in Charge, Anthracite District, State Survey of Pennsylvania.
208 South Centre street, Pottsville, Penn.
- HILL, ROBERT T.** Palæontology.
 School of Geology, University of Texas.
Austin, Texas.
- ***HITCHCOCK, C. H., Ph.D.** Geology.
 Professor of Geology and Mineralogy, Dartmouth College.
Hanover, N.H.
- HOWELL, WILLIAM H., B.A., Ph.D.** Physiology.
 Professor of Physiology, University of Michigan.
Ann Arbor, Michigan.
- HUNT, T. STERRY, A.M., LL.D.** Mineralogy and Geology.
Care Mr. James Douglas, Spuyten Duyvil, N.Y.
- ***HYATT, ALPHIEUS, S.B.** Palæontology and Zoölogy.
 Curator of the Boston Society of Natural History, and Assistant in Museum of Comparative Zoölogy, at Cambridge, Mass.
Boston Society of Natural History, Boston, Mass.
- IDDINGS, JOSEPH P., Ph.B.** Geology and Lithology.
 Assistant Geologist, U.S. Geological Survey.
Washington, D.C.
- JACKSON, ROBERT TRACY, B.S., D.S.** Zoölogy and Palæontology.
89 Charles street, Boston, Mass.
- JAYNE, HORACE, M.D.** Vertebrata.
 Professor of Vertebrate Morphology, University of Pennsylvania.
Biological Department, University of Pennsylvania, Philadelphia, Penn.
- JEFFRIES, J. AMORY, A.B., M.D.** Anatomy.
3 Exeter street, Boston, Mass.
- JORDAN, DAVID STARR.** Biology.
 President of Indiana University.
Bloomington, Ind.

- JORDAN, EDWIN O., B.S. Biology.
Assistant in Bacteriology, Mass. State Board of Health;
Lecturer on Biology, Mass. Institute of Technology.
Mass. Institute of Technology, Boston, Mass.
- JULIEN, ALEXIS A., Ph.D. Biology and Petrography.
Instructor in Biology and Microscopy, School of Mines,
Columbia College.
School of Mines, Columbia College, New York, N.Y.
- *KINGSLEY, J. S., D.Sc. Zoölogy.
Editor of "American Naturalist," Professor of Zoölogy in
University of Nebraska.
Lincoln, Neb.
- KNOWLTON, FRANK II., M.S. Geology.
U.S. Geological Survey, Washington, D.C.
- LEE, F. S., Ph.D., A.M. Physiology.
Associate in Physiology and Histology, Bryn Mawr College.
Bryn Mawr, Penn.
- *LEE, LESLIE A., Ph.D. Geology and Biology.
Professor of Geology and Biology, Bowdoin College.
Brunswick, Me.
- LEE, THOMAS G., M.D. Histology.
Lectures on Normal Histology.
Yale University, New Haven, Conn.
- *LIBBEY, WILLIAM, Jr., A.M., D.Sc. Histology.
Professor of Physical Geography, Princeton College, and
Director of the E. M. Museum of Geology and Archaeology.
Princeton, N.J.
- LUCAS, FREDERIC A. Avian Osteology.
Assistant Curator, Department of Comparative Anatomy,
U.S. National Museum.
Washington, D.C.
- *MACCOSKIE, GEORGE, D.Sc., LL.D. Biology.
Professor of Biology, Princeton College.
Princeton, N.J.
- MARK, EDWARD L. Biology.
Hersey Professor of Anatomy, Harvard University.
21 North avenue, Cambridge, Mass.

- *MARSHALL, JOHN P., A.M. Mineralogy and Geology.
Professor of Mineralogy and Geology, Tufts College.
College Hill, Mass.
- *MARTIN, H. NEWELL, A.M., M.D., D.Sc., F.R.S. Physiology.
Professor of Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- *McGEE, W. J. Geology.
Geologist, U.S. Geological Survey.
U.S. Geological Survey, Washington, D.C.
- McMURRICH, J. PLAYFAIR, M.A., Ph.D. Animal Morphology.
Docent in Morphology, Clark University.
Clark University, Worcester, Mass.
- *MEEHAN, THOMAS.
Botanist to the Pennsylvania State Board of Agriculture,
Vice-President, Academy of Natural Sciences, Philadelphia.
Germantown, Penn.
- *MERRIAM, C. HART, M.D. Mammals and Birds.
Chief of Division of Economic Ornithology and Mammalogy
of the U.S. Department of Agriculture, and Secretary of
the American Ornithologists' Union.
Washington, D.C.
- *MERRILL, F. J. H., Ph.B. Geology.
Fellow in Geology, Columbia College.
New York, N.Y.
- *MERRILL, GEORGE P., M.S. Lithology.
Curator of Lithology and Physical Geology, U.S. National
Museum.
National Museum, Washington, D.C.
- MILLS, T. WESLEY, M.D. Biology.
Professor of Physiology, McGill University.
Montreal, Canada.
- *MINOT, CHARLES SEDGWICK, S.B., S.D. Biology.
Assistant Professor of Embryology and Histology, Harvard
Medical School.
Harvard Medical School, Boston, Mass.
- MIXTER, SAMUEL J., B.S., M.D. Anatomy.
Demonstrator of Anatomy, Harvard Medical School.
Harvard Medical School, Boston, Mass.

- ***MORSE, EDWARD S., Ph.D.** Anthropology and Zoölogy.
Director of the Peabody Academy of Science, Salem, Mass.
Salem, Mass.
- ***NEWBERRY, J. S., M.D., LL.D.** Geology.
Professor of Geology, School of Mines, Columbia College.
School of Mines, Columbia College, New York, N.Y.
- ***NILES, WILLIAM H., Ph.B., A.M.** Physical Geography and
Historical Geology.
Professor of Geology and Geography, Massachusetts Institute of Technology.
Mass. Institute of Technology, Boston, Mass.
- OLIVER, CHARLES A., A.M., M.D.** Special Sense Morphology and Physiology.
Ophthalmic Surgeon to St. Mary's Hospital, Philadelphia.
1507 Locust street, Philadelphia, Penn.
- OSBORN, HENRY FAIRFIELD, Sc.D.** Vertebrate Morphology.
Professor of Comparative Anatomy, Princeton College.
Princeton, N.J.
- ***PACKARD, A.S., A.M., M.D., Ph.D.** Zoölogy.
Professor of Zoölogy and Geology, Brown University.
Brown University, Providence, R.I.
- PARKER, GEORGE HOWARD, S.B.** Animal Morphology.
Instructor in Zoölogy, Harvard College.
8 Harris street, Cambridge, Mass.
- ***PEALE, A. C., A.M., M.D.** Geology.
Geologist, U.S. Geological Survey.
Geological Survey, Washington, D.C.
- ***PECKHAM, GEORGE W., M.D.** Biology.
Teacher of Biology, Milwaukee High School.
Milwaukee, Wis.
- PENFIELD, SAMUEL L., Ph.B.** Mineralogy.
Assistant Professor of Mineralogy, Yale University.
Peabody Museum, New Haven, Conn.
- ***PILLSBURY, J. H.** Biology.
Professor of Biology, Smith College.
Northampton, Mass.
- ***POWELL, J. W., Ph.D., LL.D.** Anthropology and Geology.
Director of the U.S. Geological Survey, and Director of the Bureau of Ethnology, Smithsonian Institution.
Geological Survey, Washington, D.C.

- *PRENTISS, A. N., M.S. Botany.
Professor of Botany, Horticulture, and Arboriculture, Cornell University.
Cornell University, Ithaca, N.Y.
- PROSSER, CHARLES S., M.S. Geology and Palaeontology.
U.S. Geological Survey.
Washington, D.C.
- *PUTNAM, FREDERICK W. Archæology and Ethnology.
Peabody Professor of American Archæology and Ethnology,
Harvard University; Curator of the Peabody Museum of Archæology and Ethnology, in connection with Harvard University; Permanent Secretary of the American Association for the Advancement of Science; Massachusetts State Commissioner on Inland Fisheries; and President, Boston Society of Natural History.
Peabody Museum, Cambridge, Mass.
- RANKIN, WALTER M., A.M., M.Sc., Ph.D. Biology.
Instructor in Biology and Curator of Museum, Princeton College.
Princeton College, Princeton, N.J.
- *RATHBUN, RICHARD, M.S. Invertebrates.
Curator Dep't of Marine Invertebrates, National Museum.
U.S. National Museum, Washington, D.C.
- REICHART, EDWARD T., M.D. Physiology.
Professor of Physiology, University of Pennsylvania.
University of Pennsylvania, Philadelphia, Penn.
- *RICE, WILLIAM NORTH, Ph.D., LL.D. Geology.
Professor of Geology, Wesleyan University.
Middletown, Conn.
- *RILEY, C. V., A.M., Ph.D. Entomology, Mycology.
Entomologist of the U.S. Department of Agriculture, and Curator of Insects, U.S. National Museum.
1700 13th street, N.W., Washington, D.C.
- *ROTHROCK, J. T., M.D., B.S. Botany.
Professor of Botany, University of Pennsylvania.
West Chester, Chester Co., Penn.
- *RUSSELL, ISRAEL C. Geology.
U.S. Geological Survey, Washington, D.C.

- ***SARGENT, CHARLES S.** Botany.
Professor of Arboriculture, Harvard University, and Director of the Arnold Arboretum.
Brookline, Mass.
- ***SCOTT, WILLIAM B., Ph.D.** Animal Morphology.
Professor of Geology and Palæontology, Princeton College.
Princeton, N.J.
- ***SCUDER, S. H., A.M., S.B.** Entomology and Palæontology.
Palæontologist, U.S. Geological Survey.
Cambridge, Mass.
- ***SEDWICK, WILLIAM T., Ph.D.** Biology.
Associate Professor of Biology, Massachusetts Institute of Technology.
Massachusetts Institute of Technology, Boston, Mass.
- SEWALL, HENRY, B.Sc., Ph.D.** Physiology.
Adirondack Cottages, Saranac Lake, Franklin Co., N.Y.
- ***SHAKESPEARE, E. O., A.M., M.D.** Histology.
Ophthalmic Surgeon and Pathologist to Philadelphia (Charity) Hospital.
1336 Spruce street, Philadelphia, Penn.
- SHALER, N. S., A.M., S.D.** Palæontology.
Professor of Geology, Harvard College, and Geologist, U.S. Geological Survey.
Cambridge, Mass.
- ***SHARP, BENJAMIN, M.D., Ph.D.** Animal Morphology.
Professor of Invertebrate Zoölogy, Academy of Natural Sciences of Philadelphia.
Academy of Natural Sciences, Philadelphia, Penn.
- ***SHUFELDT, R. W., M.D., C.M.Z.S.** Anatomy of Vertebrates.
Captain, Medical Department, U.S.A.
Care of Smithsonian Institution, Washington, D.C.
- SMITH, JOHN B.** Entomology.
Rutgers College.
New Brunswick, N.J.
- SMITH, ROBERT MEADE, A.M., M.D.** Physiology.
Professor of Comparative Physiology, University of Pennsylvania.
332 South Twenty-first street, Philadelphia, Penn.

- *SMITH, SIDNEY M., Ph.D. Biology.
Professor of Comparative Anatomy, Yale University.
147 Whalley avenue, New Haven, Conn.
- THACHER, JAMES K., M.D., B.A. Zoölogy.
Professor of Physiology and Clinical Medicine, Yale University.
206 Crown street, New Haven, Conn.
- TILTON, JOHN L., A.B. Biology.
Professor of Natural Science, Simpson Centenary College.
Indianola, Ia.
- *TRUE, FREDERICK W., M.S. Vertebrates.
Curator of Mammals, U.S. National Museum.
National Museum, Washington, D. C.
- TUCKERMAN, FREDERICK, M.D., B.Sc. Anatomy.
Fellow in Anatomy, Clark University.
Clark University, Worcester, Mass.
- TUTTLE, ALBERT H. Biology.
Professor of Biology, University of Virginia, Va.
University of Virginia, Va.
- *TYLER, J. M., A.B. Zoölogy.
Professor of Zoölogy and Botany, Amherst College.
Amherst, Mass.
- *VAN VLECK, B. H., S.B. Biology.
Instructor in Biology and Physiology in Boston University.
Boston Society of Natural History, Boston, Mass.
- VERRILL, A. E., M.A. Zoölogy.
Professor of Zoölogy, Yale University.
86 Whalley avenue, New Haven, Conn.
- *WADSWORTH, M. E., A.M., Ph.D. Mineralogy, Petrography,
and Geology.
Director of the Michigan Mining School, and Professor of
Mineralogy, Petrography, and Geology; also State Geolo-
gist of Michigan.
Michigan Mining School, Houghton, Mich.
- *WALCOTT, C. D. Palæontology and Geology.
Palæontologist, U.S. Geological Survey, and Hon. Curator
of Invertebrate Paleozoic Fossils, U.S. National Museum.
National Museum, Washington, D. C.

- *WARD, HENRY A., A.M. Natural Science.
Head of Ward's Natural Science Establishment.
No. 16 to 26 College avenue, Rochester, N.Y.
- *WARREN, J. W., A.B., M.D. Physiology.
Instructor in Physiology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- WATASE, S., B.S. Biology.
Fellow in Morphology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- WHITE, CHARLES D., B.S. Palaeobotany and Geology.
Assistant Palaeontologist, U.S. Geological Survey.
U.S. National Museum, Washington, D.C.
- *WHITFIELD, R. P., M.A. Palaeontology.
(Late Professor at Troy, N.Y.), Curator of Geology and
Conchology, American Museum of Natural History.
*American Museum of Natural History, 77th street and
8th avenue, New York, N.Y.*
- *WHITMAN, C. O., A.M., Ph.D. Animal Morphology.
Editor, "Journal of Morphology;" Director of the Marine
Biological Laboratory, Woods Hole, Mass.; Professor of
Morphology, Clark University.
Worcester, Mass.
- *WHITNEY, W. F., M.D. Pathology.
Curator of the Museum of the Harvard Medical School.
Harvard Medical School, Boston, Mass.
- *WILDER, BURT G., B.S., M.D. Vertebrate Morphology.
Professor of Physiology, Comparative Anatomy, and Zoölogy,
and Curator of Vertebrate Museum, Cornell University.
Cornell University, Ithaca, N.Y.
- WILLIAMS, GEORGE HUNTINGTON, A.B., Ph.D. Mineralogy.
Associate Professor of Mineralogy and Petrography, Johns
Hopkins University.
Johns Hopkins University, Baltimore.
- *WILLIAMS, HENRY S., Ph.D. Geology and Palaeontology,
Professor of Geology and Palaeontology, Cornell University,
and Assistant Geologist, U.S. Geological Survey.
Cornell University, Ithaca, N.Y.

- WILLISTON, SAMUEL W., M.D., Ph.D. Anatomy.
 Assistant Professor of Anatomy, Yale University.
New Haven, Conn.
- *WILSON, EDMUND B., Ph.B., Ph.D. Animal Morphology.
 Professor of Biology, Bryn Mawr College, Penn.
Bryn Mawr, Penn.
- WILSON, W. P., B.S., D.Sc. Botany.
 Professor of Physiological Botany, Department of Biology,
 University of Pennsylvania.
Philadelphia, Penn.
- WINCHELL, ALEXANDER, LL.D. Geology.
 Professor of Geology and Palaeontology, University of Michigan.
Ann Arbor, Mich.
- WOLFF, JOHN E., A.B. Petrography.
 Instructor in Petrography, Harvard University.
15 Story street, Cambridge, Mass.
- *WRIGHT, R. RAMSAY, M.A., B.Sc. Zoölogy.
 Professor of Natural History, University College, Toronto,
 Canada.
University College, Toronto, Canada.
- *YARROW, H. C., M.D., Acting Asst.-Surg., U.S.A. Herpetology.
 Curator, Department of Reptiles, U.S. National Museum.
814 17th street, N.W., Washington, D.C.
- YOUNG, W. J., M.D. Biology.
 Editor of "Popular Science Monthly."
Office of "Popular Science Monthly," 1 Bond street, New York, N.Y.

Number of honorary members	4
" " members	<u>154</u>
Total	158

EIGHTH MEETING, AT NEW YORK CITY.

DECEMBER 27, 1889.

LECTURE-ROOM 15, COLUMBIA COLLEGE.

MORNING SESSION.

President Goodale in the chair. Sixteen members present.

The President appointed —

SAMUEL F. CLARKE,
GEORGE MACLOSKIE,
E. A. ANDREWS,

a committee to audit the Treasurer's Report.

Samuel F. Clarke reported on behalf of the Committee on Science Teaching in the Schools. (The text of the report has been joined with that made at the next session, and will be found in that portion of the minutes.)

The report was accepted, and a continuance of the Committee voted.

The President's address was then delivered.

GENTLEMEN,—I invite you to consider next the perplexing general question of Science in the Schools. This question has, at some time or other, in some form or other, engaged the attention of every member of the Society. To its consideration we have devoted much time in our annual sessions, and we have asked some of the most judicious and experienced teachers in our ranks to give it their special study, and to report to the Society the results of their deliberations. One of these reports of progress, characterized by thoroughness and acuteness, is before us in print, and has doubtless been examined with interest by every person now present.

It is not with any expectation that I can add anything of much value to a report which is well-nigh exhaustive, that I venture to bring before you a single phase of this ever-recurring

problem ; but it has seemed to me that the phase which I shall now ask you to look at for a few minutes may assume some new relations of perspective and be worth a glance. It is barely possible that it may provoke fresh discussion.

Let me disavow, at the beginning of my remarks, any claim to originality in the propositions which are to be submitted. My manner of regarding the problem has been forced upon me by conversations and discussions with my colleagues, and with a great many other teachers. Hence the case is decidedly one of limited liability.

It will be well for us to be sure at the outset that we all occupy nearly the same point of view in looking at the main points of the problem. Hence I may ask, —

1st. Are we not agreed in believing that although the courses of studies in our primary and grammar schools are, in popular phrase, crowded to repletion, the results in discipline and acquisition are by no means commensurate with the enormous expenditure of money, strength, and time? Do we not find that many of our young people come to the high and preparatory schools with a distinct disrelish for hard and telling study? Is there not a great amount of listlessness or dawdling? And yet we know that the teachers are working well up to the full measure of their strength ; alas, in too many cases, far beyond their strength.

One can perhaps take it for granted that you have asked yourselves whence comes this tendency to dawdle. It cannot spring wholly from mere idleness, for youths of both sexes are naturally inquisitive, and are prone to ask even awkward questions until they are subdued by timely or untimely snubbing. Now, at some point in the current discipline of a few, at least, of our schools this alertness of mind is replaced by dulness and inattention. Often enough this unfortunate change dates from the period of discouragement when the pupil, compelled to try too many things at once, gives up in despair—or it is coincident with the time when the teacher makes the fatal mistake of doing the pupil's work. There is no class of pupils more apathetic than the personally-conducted. They cannot tell for their lives whether they are in one strange city or another at any given moment. In the case first mentioned, the living structure has been weighted above its limits of elasticity, and becomes deformed beyond hope of

recovering its normal relations of shape. In the other, the structure which should be able to carry easily and without the least distortion a given weight, is absurdly and unnaturally supported by clumsy outside aids. Both kinds of discipline are faulty. Both kinds result in crippling the organism, and reducing its power of efficient work.

2d. But if the discipline is faulty, what shall we say of the poverty of acquisition? It seems as if some teachers in their praiseworthy striving after methods of mental discipline had overlooked the need of mental furnishing. And hence it has come to pass that some pupils who have gone through all the grades up to the plane of the first year in college, are unacquainted with the simplest facts in nature. There is not a teacher here who has not fallen in with a few of these helpless beings. The question before us is, Can any part of this mischief be remedied by the treatment which we, as a Society of Naturalists, propose? We must remember that in all branches of study these defects which I have mentioned are recognized, and we must bear in mind that ours is not the only remedy suggested.

In passing to the main proposition, I must refer for a moment to a question of the second order, which concerns all teachers in all grades; namely, the daily sequence of studies.

A curriculum covering a term of years regards the arrangement of studies term by term and year by year, but ordinarily pays little attention to the order in which these studies follow one another each day or in the days of the week. The daily arrangement in most schools is based chiefly on convenience in running the machine: studies are put in where they will fit, and many a round peg finds itself in a square hole.

It makes little difference to some people whether the order of dishes at a dinner follows the line of least resistance from soup through fish, and thence to the joint, and afterwards to the salad, and so on, or the reverse; and, so far as the stomach, considered as a mere receptacle, is concerned, it amounts to pretty much the same thing. But the stomach, as an organ for digestion, does not take that view of it at all. It does make some difference when one dish takes its place. Now, if the pupil's mind is a mere hold-all, that is one thing, and the daily order makes no particular difference; if, on the other hand, the

mind is an organ for digestion and assimilation of materials for healthful mental growth, that is quite another. In one sequence you can keep up a natural eager relish for that which is to come next ; by some unwise sequence you may create a disrelish.

This brings me to my main proposition. It has appeared to me more than likely that part of this listlessness on the one hand and of poverty of mental furnishing on the other, might be changed for the better by the introduction into the curriculum of each of our schools, no matter what its grade, of a simple scientific work which should aim at *two* things. As a rule, in shooting, or in teaching others to shoot, it is considered rather better to aim at one thing at a time ; but my suggestion aims at two, namely, discipline and the acquisition of a few facts worth having. But mine is a shot-gun policy.

In brief, my plan is this : to have a short composite treatise on what, for want of a better term, we call Physiography, or Physical Geography, giving in the clearest manner the few absolutely necessary facts and essential principles of the tributary sciences so far as these bear on the ordinary simple matters of common observation ; but all of the work to be done by masters in these sciences and to be edited by a master in Pædagogics. Such a work would consist of these facts and principles of the following long list of the tributary sciences ; viz., rudimentary astronomy, meteorology, lithology, physics, chemistry, botany, zoölogy, and possibly dynamical geology, arranged in an orderly, natural manner, and given in the fewest words. The facts and principles thus brought together would be within very narrow limits, for they would be simply the facts and principles which illustrate elementary physical geography, being those only which every well-educated person in these days of extreme differentiation ought to be ashamed not to know. So much for the rote part of the work. But my impracticable proposition contemplates also that which is far removed from rote ; namely, the attachment to each of these fragments of an outline of laboratory or practical work, giving the soundest methods of independent study in that science.

The scheme proposes the selection, by the teacher, of *one* of these practical outlines ; it does not ask that any teacher or any pupils should be compelled to use more than one of the outlines. That is to say, if a teacher does not care for botany or zoölogy or

physics or chemistry, let him put his students to work in meteorology, and, with the simplest appliances, examine the changes in the sky. But the teacher who is inclined to botanical study might make use of the botanical outline for his pupils, and the chemically inclined, the chemical one, and so on. The teacher would naturally use that study which he likes best as the entering wedge to secure a little preliminary training in scientific method, and he would let the other outlines alone. In this way we ought to obtain for our pupils efficient instruction in the method of some one science. It is inconceivable that the range of selection which I have suggested should not be sufficiently large to meet every case. At any rate, if a teacher couldn't find some one outline which he or she could make use of, that teacher is not fit to be trusted with a school or a child.

Thus, according to my proposition, the grammar-school teacher would have a well-edited compend of the rudiments of the various sciences tributary to the study of Physical Geography, and in this coördinated handbook would be given the methods for simple practical laboratory work in the beginnings of each of those sciences, one of which *must* supplement the mechanical teaching and the learning by rote. It appears to me a matter of absolute indifference which science is studied for a glimpse of scientific method; one is as good as another. The main thing is to wean the helpless from the book as their exclusive source of nourishment; for this study of nature a cloud is as good a thing to examine as a plant or a butterfly.

One of the chief advantages to be gained by the pupil would be the recognition of the fact that the scientific method is applicable to every branch of study. In fact, it has won some of its greatest victories in fields remote from the territory occupied by the sciences properly so called. Faithfully studied, and honestly used as a guide, the simple treatise would place every pupil in possession of a few uncontested facts and fundamental principles in the elementary physical and natural sciences.

More than this, and better than this, it would show each pupil what is meant by scientific method. We believe, do we not, that the true scientific method is characterized by singleness of purpose, directness of aim, thoroughness, and absolute truthfulness; that it stands inflexibly opposed to aimlessness, superficiality, and lack of candor.

Above all, it must be remembered that our proposition would meet the cases of the vast majority of our grammar and high school pupils who cannot find time or means for a college course. Even the slight glimpse, which such a work as that now referred to would give, of scientific data and scientific method, might prove of lasting benefit.

There are numerous objections to my suggestion.

In the first place, it may seem too much like an attempt to provide a treatise on Quaternions in words of one syllable, or a pocket encyclopædia for infants. Hence it might be found difficult to secure the separate contributions from authorities of the first rank. But when I remember that first-class science primers have been made by men who have a right to speak with authority and at first hand, I have been encouraged to think that our series of shorter science primers could be secured for the composite which I have ventured to propose. It will be found more difficult to secure a proper editor for the coördinating of these most rudimentary of primers. But there is one of our former members in whose hands the work would be perfectly safe, viz., President Stanley Hall.

The second objection to the scheme is that it seems to be partially analogous to what is called in agriculture the method of ensilage. In ensilage almost anything, even remotely nutritious, is cut fine enough and crowded with a host of odds and ends into a receptacle known as a silo. In this silo, if the things are left long enough, they are believed to undergo a change analogous to fermentation by which the mass can be utilized as food for animals. Now, it is no such incongruous ensilage that I beg for our youth. I ask, simply and solely, for coördinated authoritative primers, and for some selection in the matter of laboratory work.

A third objection, and a weighty one, is that it might result in evolving a good many students of that objectionable class who know it all. Well, on the whole, if this book of coördinated fragments could be made what I should wish, it would be well worth learning, and its method well worth securing, and a student who knew it all would be better than the one who does not know anything.

I intrust to your charitable and serious consideration this frail raft of suggestions, freighted though it is with a heavy weight

of grave objections. I have some forebodings that it may speedily be wrecked, and come to grief when it meets discussion. It is asking too much to hope that the scheme will hold together, but if it is wrecked, there may perhaps be enough material from which under your hands a better and stronger craft can be constructed.

THE TREASURER'S REPORT, 1889.

AMERICAN SOCIETY OF NATURALISTS.

Income.

Balance as per report, Dec. 27, 1888	\$764 81
Dues received to Dec. 24, 1889	149 00
	<hr/>
	\$913 81

Outgo.

1889.	
Sept. 5. S. F. Clark, Exp. Baltimore meeting	\$28 10
Apr. 29. Guggenheimer, Weil, & Co., printing for Baltimore meeting	21 00
July 1. Rockwell & Churchill, Records, 1889	49 40
Dec. 19. S. F. Clarke, Exp. Committee Science in Schools	34 53
" " H. H. Donaldson, Exp. of Secretary	10 95
" 23. Ginn & Co., for six copies "Jour. Morph."	60 00
" " Postage	5 63
	<hr/>
To balance on hand,	\$209 61
	<hr/>
	704 20
	<hr/>
	\$913 81 \$913 81

Respectfully submitted,

WILLIAM T. SEDGWICK,
Treasurer.

DEC. 27, 1889.

The following papers were presented : —

GEORGE BAUR : On the Morphology of the Vertebrate Skull.

J. PLAYFAIR McMURRICH : On Wax Models.

CHARLES A. OLIVER : Description of a Series of Tests for the Detection and Determination of Sub-normal Color-perception (Color-blindness), designed for use in Railway Service. (Read by the Secretary.)

It was voted that a Committee on Conference, composed of three members, be appointed by the Society to confer with the new Geological, Physiological, and Anatomical Societies, and arrange for the future coöperation of the Society of Naturalists with these special societies.

The Committee named were —

J. PLAYFAIR McMURRICH,

J. H. PILLSBURY,

HENRY F. OSBORN.

The Society then adjourned, to meet in the same place December 28, at 9.30 A.M.

On December 27, 8 P.M., the Annual Dinner was held at the Grand Union Hotel, twenty-three members attending.

SATURDAY, DECEMBER 28.

COLUMBIA COLLEGE, 9.30 A.M.

President Goodale in the chair. Twenty-nine members present.

A Nominating Committee was appointed by the President, as follows : —

E. S. MORSE,

H. F. OSBORN,

J. H. EMERTON,

W. N. RICE,

J. H. PILLSBURY.

Wm. T. Sedgwick made an informal report in behalf of the Committee on the "Journal of Morphology." The report was accepted, and the Committee continued.

The full Committee on the "Journal of Morphology" being —

A. HYATT,
W. T. SEDGWICK,
E. L. MARK.

The Nominating Committee recommended the following persons as officers for the ensuing year: —

President. — H. NEWELL MARTIN.

Vice-Presidents. — SAMUEL F. CLARKE,
WILLIAM NORTH RICE,
R. RAMSAY WRIGHT.

Secretary. — HENRY H. DONALDSON.

Treasurer. — WM. T. SEDGWICK.

Members of Executive Committee from the Society at Large. — WM. LIBBEY, JR., WM. M. DAVIS.

They were duly elected.

The Committee on Conference, appointed at the previous session, was instructed to report at the next meeting of the Society in 1890.

In behalf of the Committee on Science Teaching in the Schools, Samuel F. Clarke made a report, which was discussed by paragraphs, and finally adopted in the following form: —

The Committee on Science Teaching in the Schools beg leave to submit the following report: —

An edition of several thousand copies of the Report adopted at the Baltimore meeting has been published, and most of them have been distributed.

Many of the daily papers and periodicals, scientific, educational, and general, have given more or less extended notices of it.

We have secured the publication of a pamphlet on Science Teaching in the Schools, by D. C. Heath & Co., of Boston, as one of their series of Educational Monographs. This pamphlet contains the address delivered by Professor William North Rice before this Society at the New Haven meeting, the Report of this Committee presented to you last year, and a detailed statement of the work in Natural Science prescribed for the Public Schools in Middletown, Conn., where the Board of Education has recently adopted a course of study based on the principles announced in our Report.

While the pamphlet is not issued as an official document, for which the Society or their Committee are responsible, but is published by Heath & Co. as one of their series on allied subjects, and without expense to the Society, it is believed that the views presented in Professor Rice's address and illustrated in the Middletown course of study are in substantial harmony with the aims of the Society, and that the publication of the pamphlet will be serviceable to the cause.

One line of work contemplated in the report adopted at the Baltimore meeting was the presentation of the views of the report by delegations at some of the leading educational associations. Circumstances have prevented the accomplishment of as much as was intended, but somewhat has been done.

In April was held in Boston the Annual Meeting of the Commission of New England Colleges on Entrance Examinations. Professors Farlow and Rice were present as delegates from the Society to advocate the addition of somewhat of Natural Science to the requirements for admission to College. Professor Tyler, of Amherst College, was present as a member of the Commission. The subject was discussed in a free and conversational manner at considerable length. The result of the discussion is embodied in the following circular of Professor Poland, Secretary of the Commission, addressed to the Faculties of the various Colleges :—

"7 COOKE STREET, PROVIDENCE, R.I., 23 October, 1889.

"The Commission of Colleges in New England on Admission Examinations, at its last annual meeting, by request of the American Society of Naturalists, listened to arguments presented by accredited representatives of that Society in support of the following proposition :—

"'An elementary (but genuine and practical) acquaintance with some one or more departments of Natural Science should be required for admission to College.'

"Professor W. N. Rice, of Wesleyan University, and W. G. Farlow, of Harvard University, representing the Society, and J. M. Tyler, of Amherst College, sitting as a member of the Commission, urged that the existing requirements do not prepare the minds of students for College instruction in Natural Science; that students coming without suitable preparatory training bring

faculties of observation pretty nearly atrophied by long disuse, and are thus incapable of receiving much benefit from such instruction; that so important a part of education ought not to be neglected in schools of any grade; that a recognition of it by the Colleges in their requirements for admission is the best means to introduce it in the lower schools.

"The Commission discussed the proposition carefully, and questioned those who urged it, as to the details involved, and as to how the difficulty of introducing such a requirement may be met. Finally it was voted:—

"1. That the Commission regards the communication made by Professors Rice and Farlow as important and deserving the consideration of the Colleges.

"2. That a report of this communication be transmitted to the several Faculties of our Associated Colleges.

"Will you, therefore, when convenient, lay this report before the Faculty of — — for their consideration? I shall send you for distribution among the members of the Faculty copies of a circular issued by the American Society of Naturalists, in which their propositions and plans are set forth. On the third page is their statement of what they recommend as desirable branches of Natural Science to be required for admission to College. I also send you a copy of a Monograph in which the whole subject is discussed less briefly. A course of study in Natural Science actually followed in the Public Schools in Middletown, Conn., is exhibited in this pamphlet.

"I have the honor to remain,

"Very respectfully yours,

"W. C. POLAND,

"Secretary of the Commission."

At the University Convocation of the State of New York, lately known as the Regents of the University of the State of New York, our Committee was represented by Professor Samuel F. Clarke. The subject of Science Teaching was given the post of honor on the programme, and the remarks were listened to with apparent interest. Some discussion followed, which showed a decided sympathy with our views, not only among the teachers of science, but also in marked degree among the teachers in other departments.

In October was held in Boston the Annual Meeting of the New England Association of Colleges and Preparatory Schools. The subject of the addition of Natural Science to the preparatory course was presented by Professor Rice. His address is published in the Proceedings of the Association. The fulness of the programme for the meeting rendered any extended discussion impracticable, but the sympathy of the meeting with the cause was expressed in the following resolution introduced by President Capen, of Tufts College, and unanimously adopted :—

"Resolved, That the subject brought to our attention by the American Society of Naturalists, through Professor William North Rice, is one of great importance ; and therefore we would, as far as we are empowered to act, commend it to the careful consideration of the New England Colleges and the teachers of the Secondary Schools."

In November was held in New Haven the Annual Meeting of the Association of New England Colleges. The subject of the addition of somewhat of Natural Science to the preparatory course was discussed at considerable length, the discussion being opened by Professor Rice, who was present as the delegate from Wesleyan University. No vote was passed by the Association ; but the general sentiment in the discussion was that of belief in the desirability of such a change, though the majority seemed to believe the practical difficulties insuperable at present.

The general subject of Science in Schools of all grades was presented by Professor Rice at the meeting of the Association of High School and Academy Teachers of Western Massachusetts, in Holyoke, in December.

There is much of encouragement to be derived from the interest shown by educators everywhere in the subject of science work in the schools. The subject was discussed at the meeting of the American Institute of Instruction, and the sentiment of that representative body of teachers was thoroughly in favor of the proposed reforms. A place on the programme had been assigned to a member of your Committee, but he was prevented by illness from attending. The Committee have also been asked to appear by delegate at the Holiday Conference of Associated Academic Principals of New York State, meeting at Syracuse to-day.

The Massachusetts State Board of Education strongly favor the introduction of science into the lower grades of schools, and the Normal Schools are preparing to furnish their students with specific training for that work. Courses designed to fit the teachers for elementary science work are in successful operation in the Connecticut Normal Schools.

While it would be too sanguine an expectation to look for any speedy establishment of improved courses of study in the majority of the schools, it is evident that the public mind is becoming awake to the importance of the subject, and progress is being made in the right direction.

There seem to be certain special difficulties attending the addition of Natural Science to the preparatory course for College at present. The growing tendency of most of the Colleges to uniformity of requirements increases the resistance of simple inertia to any change. The collective Colleges form a larger mass than any individual College. The agitation commenced some years ago in favor of the addition of Modern Languages to the preparatory course increases the difficulty of adding anything else at present. There is also difference of opinion among those who favor the introduction of science into the preparatory course as to what sciences should be chosen for this purpose. While the majority of the Committee still believe in the eligibility for this purpose of the three branches recommended in the former report (Botany, Physical Geography, and Physiology), they believe that the question of the introduction of some science is vastly more important than the question what particular branches should be selected. It might be well to leave the selection in some degree optional.

The Committee would express the hope that the discussion of the subject at this meeting will result in sending to the Colleges, in behalf of the Society, a renewed appeal for the requirement of a certain amount of Natural Science for admission. And, in regard to the work in the lower schools, the Committee would repeat the urgent recommendation contained in their report of last year, that each member in his own neighborhood use his influence with teachers' institutes, boards of education, school committees, and trustees of particular institutions, to promote the reforms advocated by the Society.

The Committee recommend the adoption of the following resolutions :—

Resolved, That the Society of Naturalists reaffirms its adhesion to the following propositions, formulated in the report on Science Teaching in the Schools, adopted at the Baltimore meeting ; and that it will use all means of influence at its command to secure the modification of educational courses in accordance therewith :—

1. Instruction in Natural Science should commence in the lowest grades of the Primary Schools, and should continue throughout the curriculum.

2. In the lower grades the instruction should be chiefly by means of object-lessons ; and the aim should be to awaken and guide the curiosity of the child in regard to natural phenomena, rather than to present systematized bodies of fact and doctrine.

3. More systematic instruction in the Natural Sciences should be given in the High Schools.

4. While the sciences can be more extensively pursued in the English course in the High Schools than is practicable in the Classical course, it is indispensable for a symmetrical education that a reasonable amount of time should be devoted to Natural Science, during the four years of the High School course, by students preparing for College.

5. An elementary (but genuine and practical) acquaintance with some one or more departments of Natural Science should be required for admission to College.

Resolved, That the Committee on Science Teaching in the Schools be instructed to prepare a memorial to be presented to the Faculty of each of the Colleges in the country, urging that some work in Natural Science be added to the requirements for admission to College, even though that addition should necessitate some diminution of the requirements in Classics.

Resolved, That the Society express its approval of the principles underlying the recommendation in the President's address, in relation to the preparation of a collection of Science Primers ; and that the Committee on Science Teaching be instructed to consider the feasibility of the plan, and to report thereon at the next meeting.

Resolved, That Professor Goodale, of Harvard University,

Professor Osborn, of the College of New Jersey, and Professor Sedgwick, of the Massachusetts Institute of Technology, be added to the Committee; and that the Committee have power, if they shall deem it expedient, to make further additions to their number.

Resolved, That the resignation of Professor Farlow be not accepted, but that the Society earnestly request him to continue to serve on the Committee.

Resolved, That the Society approve of the presentation of the subject by representatives of the Society before influential educational associations; and that the Treasurer be authorized to pay the travelling expenses of delegates to such associations, and also the travelling expenses of members of the Committee in attending meetings of the Committee.

SAMUEL F. CLARKE,
Chairman.

The following persons, recommended by the Executive Committee, were elected to membership in the Society:—

W. J. YOUNMANS,
GEORGE HOWARD PARKER,
WALTER M. RANKIN,
ROBERT TRACY JACKSON,
EDWIN O. JORDAN,
THOMAS L. CASEY.

By a unanimous vote the Secretary was instructed to formally thank the authorities of Columbia College for the courtesies and privileges extended to the Society during its present meeting.

It was voted, further, to print four hundred copies of the President's address and the report of the Committee on Science Teaching in the Schools, in separate form, besides printing them in the official records of the Society.

The topic set for discussion, "The Use and Object of Scientific Gatherings," was presented first by H. F. Osborn and Wm. T. Sedgwick. In the debate following, Messrs. Morse, Brewer, Riley, Cope, Osborn, and others took part. Without reaching a formal decision, it appeared to be the general sense of the meeting that a more general character might be given to the papers

presented to the Society, and that, if necessary, the time devoted to the meetings might be shortened. The decision of the matter, so far as the next meeting was concerned, was delegated to the Executive Committee.

As an aid to the attainment of this object, H. F. Osborn proposed an amendment to the Constitution, according to which Article 1, Section 2, shall read as follows: "The object of this Society shall be the association of working naturalists for the discussion of methods of instruction, museum administration, and other subjects of general interest to investigators and teachers of Natural Science; and for the adoption of such measures as shall tend to the advancement and diffusion of the knowledge of Natural Science."

This was accepted by the Society with the proviso that the Executive Committee be empowered to make any merely verbal changes that were required. The phrase "other subjects of general interest" was intended to warrant the selection of more general topics than had heretofore been admitted.

The control of papers to be presented was lodged with the Executive Committee, who were given power to reject any communication deemed to be outside the scope of the Society.

The Committee of Conference was requested to report to the Executive Committee of the Society at the earliest date possible, with a view to facilitating the arrangements for the next meeting.

The following despatch was received: —

"To PROF. GEO. L. GOODALE, President of American Society of Naturalists, Columbia College, N.Y.: —

"The Association of American Anatomists sends greetings to the American Society of Naturalists, and expresses a wish for hearty coöperation.

"A. H. P. LEUF,
"Secretary."

The Society then adjourned, at 1 P.M., to meet next year at the place and time to be determined by the Executive Committee.

HENRY H. DONALDSON,
Secretary.



R E C O R D S .



LIST OF OFFICERS FOR 1891.

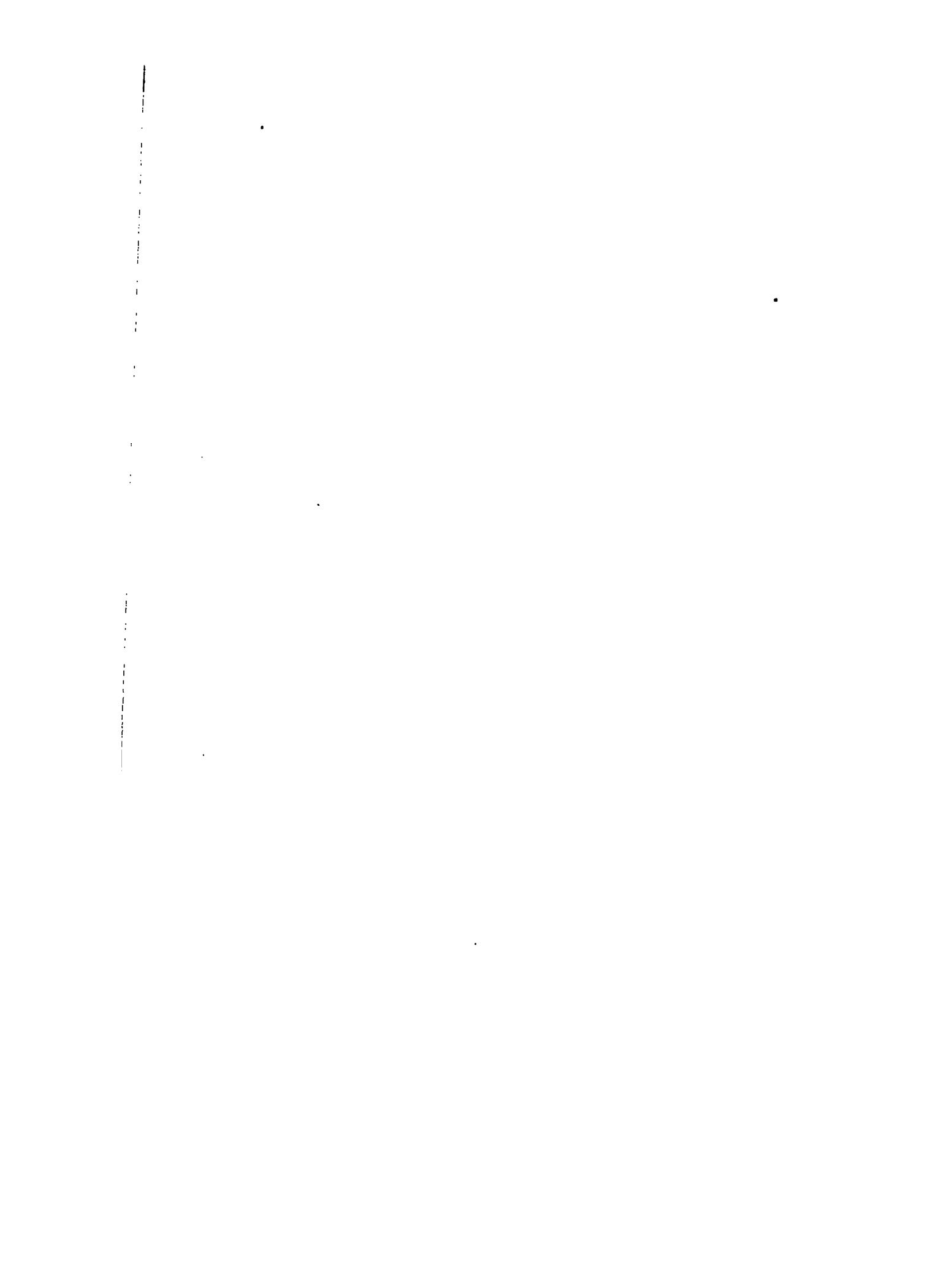
President, WM. NORTH RICE.
Vice-Presidents, { SAMUEL F. CLARKE,
 { T. WESLEY MILLS,
 { C. O. WHITMAN.
Secretary, HENRY H. DONALDSON.
Treasurer, WILLIAM T. SEDGWICK.

*Members of the Executive Committee elected from the
Society at Large.*

H. F. OSBORN, RICHARD RATHBUN.

LIST OF HONORARY MEMBERS.

*DANA, JAMES D., Ph.D., LL.D., Mineralogy, Zoölogy, Geology.
Professor of Geology, Yale University.
Yale University, New Haven, Conn.
LEIDY, JOSEPH, M.D., LL.D.
Professor of Anatomy in the University of Pennsylvania, and
Director of the Biological Department, President of the
Faculty of the Wagner Free Institute, and President of
the Academy of Natural Sciences, Philadelphia.
LESLEY, J. P., A.M., LL.D. Geology.
State Geologist of Pennsylvania.
907 Walnut street, Philadelphia, Penn.
MARSH, O. C., Ph.D., LL.D. Palæontology.
Professor of Palæontology, Yale University.
S Peabody Museum, New Haven, Conn.



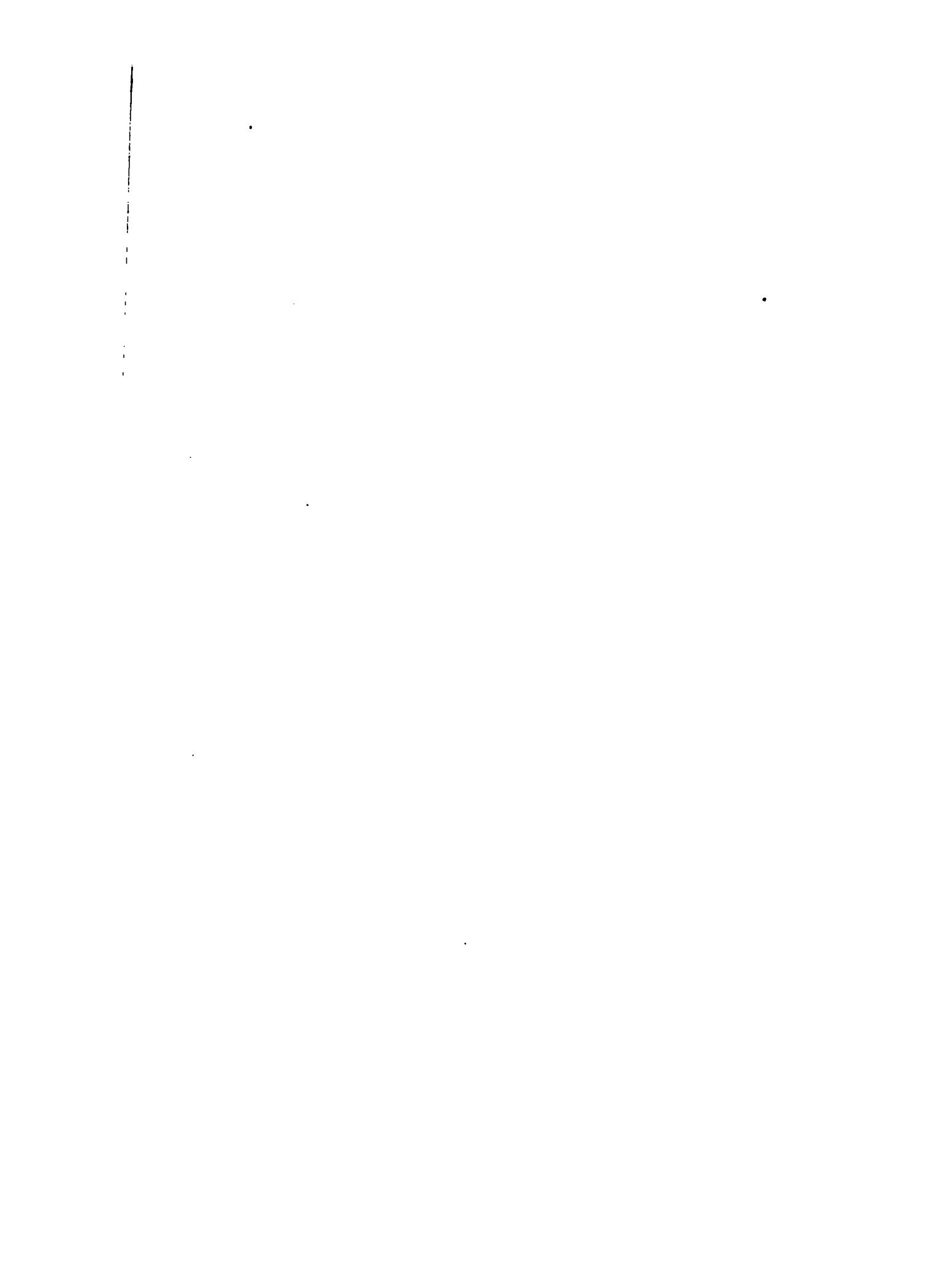
*I have the honor to inform
you of your election to
S. in the American Society of Naturalists*

Henry St. Donalson

Secretary.

BOSTON:
PUBLISHED BY THE SECRETARY.

1891.



*I have the honor to inform
you of your election to
in the American Society of Naturalists*

S.

Henry St. Donaldson

Secretary.

BOSTON:
PUBLISHED BY THE SECRETARY.
1891.



RECORDS
OF THE
AMERICAN SOCIETY
OF
NATURALISTS.

VOLUME I.

PART EIGHT.

BOSTON:
PUBLISHED BY THE SECRETARY.
1891.



R E C O R D S .



LIST OF OFFICERS FOR 1891.

President, Wm. North Rice.

Vice-Presidents, { SAMUEL F. CLARKE,
T. WESLEY MILLS,
C. O. WHITMAN.

Secretary, HENRY H. DONALDSON.

Treasurer, WILLIAM T. SEDGWICK.

*Members of the Executive Committee elected from the
Society at Large.*

H. F. OSBORN, RICHARD RATHBUN.

LIST OF HONORARY MEMBERS.

***DANA, JAMES D., Ph.D., LL.D., Mineralogy, Zoölogy, Geology.**
Professor of Geology, Yale University.
Yale University, New Haven, Conn.

LEIDY, JOSEPH, M.D., LL.D.
Professor of Anatomy in the University of Pennsylvania, and
Director of the Biological Department, President of the
Faculty of the Wagner Free Institute, and President of
the Academy of Natural Sciences, Philadelphia.

LESLEY, J. P., A.M., LL.D. **Geology.**
State Geologist of Pennsylvania.

907 Walnut street, Philadelphia, Penn.
MARSH, O. C., Ph.D., LL.D. Palaeontology.
Professor of Palaeontology, Yale University.
S. Peabody Museum, New Haven, Conn.

LIST OF MEMBERS.

[An asterisk designates original membership.]

- | | |
|---|---------------------------|
| ALLEN, C. M. | Physics. |
| <i>Pratt Institute, Brooklyn, N.Y.</i> | |
| *ALLEN, HARRISON, M.D. | Comparative Anatomy. |
| <i>1933 Chestnut street, Philadelphia, Penn.</i> | |
| ALLIS, EDWARD P., Jr. | Biology. |
| Associate Editor of the "Journal of Morphology." | |
| <i>Milwaukee, Wis.</i> | |
| ANDREWS, E. A., Ph.D. | Biology. |
| Associate in Biology, Johns Hopkins University. | |
| <i>Johns Hopkins University, Baltimore, Md.</i> | |
| BARTON, B. W., M.D. | Botany. |
| <i>Baltimore, Md.</i> | |
| BAUR, GEORGE, Ph.D. | Vertebrate Palaeontology. |
| Docent in Comparative Osteology and Palaeontology, Clark | |
| University. | |
| <i>Clark University, Worcester, Mass.</i> | |
| *BICKMORE, ALBERT S. | |
| Secretary and Professor in Charge of Department of Public | |
| Instruction of the American Museum of Natural History. | |
| <i>American Museum, Central Park, N.Y.</i> | |
| BOLTON, H. CARRINGTON, A.M., Ph.D. | Mineralogy, Chemistry. |
| <i>University Club, New York City.</i> | |
| *BOWDITCH, HENRY P., A.M., M.D. | Physiology. |
| Professor of Physiology, Harvard Medical School. | |
| <i>Harvard Medical School, Boston, Mass.</i> | |
| BRANNER, JOHN CASPER, A.M., Ph.D. | Geology. |
| State Geologist. | |
| <i>Little Rock, Arkansas.</i> | |
| BREWER, WILLIAM H., Ph.D. | Biology. |
| Professor of Agriculture, Yale University. | |
| <i>246 Orange street, New Haven, Conn.</i> | |

- *BRUSH, G. J. Mineralogy.
Director, Sheffield Scientific School.
New Haven, Conn.
- BUMPUS, H. C., Ph.B. Zoölogy.
Associate Professor of Zoölogy, Brown University.
Brown University, Providence, R.I.
- CALL, R. ELLSWORTH. Tertiary Palæontology, Mollusca.
Instructor in Natural Science, West Des Moines High
School.
662 Twentieth street, W. Des Moines, Ia.
- CAMPBELL, JOHN P., B.A. Physiology.
Professor of Biology, University of Georgia, Athens, Ga.
- CASEY, THOMAS L. Entomology.
Captain, U.S. Engineer Corps.
U.S. Army Building, New York, N.Y.
- CHITTENDEN, R. H., Ph.D. Physiology.
Professor of Physiological Chemistry, Yale University.
83 Trumbull street, New Haven, Conn.
- CLARK, WILLIAM B., Ph.D. Palæontology.
Associate in Palæontology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- *CLARKE, SAMUEL F., Ph.B., Ph.D. Zoölogy.
Professor of Natural History, Williams College.
Williamstown, Mass.
- *CONN, H. W., Ph.D.
Assistant Professor of Biology, Wesleyan University.
Middletown, Conn.
- *COPE, EDWARD D. Vertebrate Palæontology and Zoölogy.
2102 Pine street, Philadelphia, Penn.
- *COUES, ELLIOTT, A.M., M.D., Ph.D. Vertebrates, Bibliog-
raphy.
Smithsonian Institution, Washington, D.C.
- *CROSBY, W. O., S.B. Geology.
Assistant Professor of Mineralogy and Lithology, Massachu-
sets Institute of Technology.
Institute of Technology, Boston, Mass.
- DALL, WILLIAM HEALEY. Mollusca, Palæontology.
Palæontologist, U.S. Geological Survey, Honorary Curator
Department of Mollusks, U.S. National Museum.
Smithsonian Institution, Washington, D.C.

- DANA, EDWARD S., Ph.D.
Assistant Professor of Natural Philosophy, Yale University.
111 Grove street, New Haven, Conn.
- DAVENPORT, CHARLES B., A.B., A.M. Zoölogy.
Assistant in Zoölogy, Harvard University.
Cambridge, Mass.
- *DAVIS, WILLIAM M., S.B., M.E. Geology, Geography, and Meteorology.
Assistant Professor of Physical Geography, Harvard University.
Museum of Comparative Zoölogy, Cambridge, Mass.
- *DEWEY, FREDERIC P., Ph.B. Metallurgy.
Curator of Metallurgy, U.S. National Museum.
National Museum, Washington, D.C.
- *DILLER, J. S., S.B. Petrography and Geology.
Assistant Geologist in Charge of Petrographic Laboratory.
U.S. Geological Survey, Washington, D.C.
- *DIMMOCK, GEORGE, Ph.D. Zoölogy.
Canobie Lake, N.H.
- DOLLEY, CHARLES S. Biology.
Professor of General Biology in the University of Pennsylvania ; Professor of Natural History in Swarthmore College.
University of Pennsylvania, Biological Department, Philadelphia, Penn.
- *DONALDSON, HENRY H., Ph.D. Physiology.
Assistant Professor of Neurology, Clark University.
Worcester, Mass.
- *DUDLEY, WILLIAM R., M.S. Cryptogamic Botany.
Assistant Professor of Cryptogamic Botany, Cornell University.
Cornell University, Ithaca, N.Y.
- *DUTTON, C. E. Geology.
Captain of Ordnance, U.S.A.
U.S. Geological Survey, Washington, D.C.
- DWIGHT, THOMAS, A.M., M.D. Anatomy.
Parkman Professor of Anatomy, Harvard Medical School.
235 Beacon street, Boston, Mass.
- *DWIGHT, WILLIAM B., A.B., A.M., Ph.B. Palaeontology.
Professor of Natural History and Curator of the Museum, Vassar College.
Vassar College, Poughkeepsie, N.Y.

- EDWARDS, CHAS. L., A.M., Ph.D.** Zoölogy.
 Fellow in Morphology, Clark University.
Clark University, Worcester, Mass.
- ***EMERSON, B. K., Ph.D.** Geology and Mineralogy.
 Professor of Geology, Amherst College.
Amherst, Mass.
- ***EMERTON, JAMES H.** Zoölogy.
11 St. James avenue, Boston, Mass.
- ***EMMONS, S. F.** Geology.
 Geologist of the U.S. Geological Survey.
Geological Survey, Washington, D.C.
- ERNST, HAROLD C., A.M., M.D.** Bacteriology.
 Demonstrator of Bacteriology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- ***FARLOW, WM. G., A.B., M.D.** Botany.
 Professor of Cryptogamic Botany, Harvard University.
Harvard University, Cambridge, Mass.
- ***FERNALD, C. H., A.M., Ph.D.** Microlepidoptera.
 Professor of Zoölogy, Mass. Agricultural College.
Amherst, Mass.
- FEWKES, J. WALTER.**
 Secretary, Boston Society of Natural History; Assistant,
 Museum of Comparative Zoölogy.
Museum of Comparative Zoölogy, Cambridge, Mass.
- FOX, L. WEBSTER, M.D.** Anatomy and Physiology.
 Clinical Assistant, Jefferson Medical College Hospital,
 Ophthalmic Surgeon to Germantown Hospital.
1304 Walnut street, Philadelphia, Penn.
- ***GAGE, SIMON H., S.B.** Vertebrate Morphology and Physiology.
 Assistant Professor of Physiology and Lecturer on Micro-
 scopical Technology, Cornell University.
Cornell University, Ithaca, N.Y.
- GANONG, WM. FRANCIS.** Zoölogy.
119 Oxford street, Cambridge, Mass.
- GARDINER, EDWARD G., S.B., Ph.D.** Zoölogy.
 Instructor in Biology, Massachusetts Institute of Technology.
131 Mt. Vernon street, Boston, Mass.
- GARDINER, FREDERIC, A.B.** Biology.
 Instructor in Natural Science, Trinity College.
Trinity College, Hartford, Conn.

- GARMAN, SAMUEL.** Zoölogy.
 Assistant, Museum of Comparative Zoölogy.
Cambridge, Mass.
- ***GERRISH, FREDERIC HENRY, A.M., M.D.** Anatomy.
 Professor of Anatomy, Bowdoin College.
675 Congress street, Portland, Me.
- ***GILBERT, G. K.** Geology.
 Geologist of the U.S. Geological Survey;
U.S. Geological Survey, Washington, D.C.
- ***GOODALE, GEORGE L., A.M., M.D.** Botany.
 Professor of Botany, Harvard University.
Harvard University, Cambridge, Mass.
- ***GOODE, G. BROWN, A.M., Ph.D.** Zoölogy.
 Assistant Secretary of the Smithsonian Institution in charge
 of the U.S. National Museum.
Smithsonian Institution, Washington, D.C.
- GRATACAP, L. P., M.A., Ph.B.** Mineralogy and Geology.
 Assistant Curator of Geology, American Museum of Natural
 History, New York.
77th street and 8th avenue, New York, N.Y.
- ***GREENLEAF, R. W., A.M., M.D.** Botany.
241 Boylston street, Boston, Mass.
- GREGORY, EMILY L., Ph.D.** Botany.
343 Madison avenue, New York, N.Y.
- HAGUE, ARNOLD.** Geology and Petrography.
 Geologist, U.S. Geological Survey.
Geological Survey, Washington, D.C.
- ***HALL, JAMES M. S., A.M., M.D., LL.D.** Geology, Palæontology.
 State Geologist of New York, Director of the State Museum
 of Natural History.
State Museum, Albany, N.Y.
- HARE, HOBART AMORY, B.Sc., M.D.** Physiology.
 Demonstrator of Experimental Therapeutics in the Medical
 Department, and Instructor in Physiology in the Biological
 Department of the University of Pennsylvania.
117 South Twenty-second street, Philadelphia, Penn.

- ***HEILPRIN, ANGELO.** Palæontology and Geology.
 Professor of Invertebrate Palæontology at, and Curator in Charge of, the Academy of Natural Sciences of Philadelphia, and Professor of Geology at the Wagner Free Institute of Science.
Academy of Natural Sciences, Philadelphia, Penn.
- ***HENSHAW, SAMUEL.** Zoölogy.
 Assistant, Boston Society of Natural History.
Boston Society of Natural History, Boston, Mass.
- HERRICK, F. H., A.B., Ph.D.** Biology.
 Professor of Biology, Adelbert College.
Adelbert College, Cleveland, O.
- HILL, FRANK A.** Geology.
 Geologist in Charge, Anthracite District, State Survey of Pennsylvania.
208 South Centre street, Pottsville, Penn.
- HILL, ROBERT T.** Palæontology.
 School of Geology, University of Texas.
Austin, Texas.
- ***HITCHCOCK, C. H., Ph.D.** Geology.
 Professor of Geology and Mineralogy, Dartmouth College.
Hanover, N.H.
- HODGE, CLIFTON F., A.B., PH.D.** Physiology.
 Fellow in Psychology and Assistant in Neurology, Clark University.
Clark University, Worcester, Mass.
- HOWELL, WILLIAM H., A.B., Ph.D.** Physiology.
 Professor of Physiology, University of Michigan.
Ann Arbor, Mich.
- HUNT, T. STERRY, A.M., LL.D.** Mineralogy and Geology.
Care Mr. James Douglas, Spuyten Duyvil, N.Y.
- ***HYATT, ALPHEUS, S.B.** Palæontology and Zoölogy.
 Curator of the Boston Society of Natural History, and Assistant in Museum of Comparative Zoölogy, at Cambridge, Mass.
Boston Society of Natural History, Boston, Mass.
- IDDINGS, JOSEPH P., Ph.B.** Geology and Petrography.
 Geologist, U.S. Geological Survey.
Washington, D.C.

JACKSON, ROBERT TRACY, S.B., S.D. Zoölogy and Palæontology.

33 Gloucester street, Boston, Mass.

JAYNE, HORACE, M.D. Vertebrata.

Professor of Vertebrate Morphology, University of Pennsylvania.

*Biological Department, University of Pennsylvania,
Philadelphia, Penn.*

JEFFRIES, J. AMORY, A.B., M.D. Anatomy.

3 Exeter street, Boston, Mass.

JOHNSON, HERBERT P., A.M. Biology.

Assistant in Biology, Williams College.

Williamstown, Mass.

JORDAN, DAVID STARR. Biology.

President of Indiana University.

Bloomington, Ind.

JORDAN, EDWIN O., S.B. Biology.

Fellow in Morphology, Clark University.

Clark University, Worcester, Mass.

*JULIEN, ALEXIS A., Ph.D. Biology and Petrography.

Instructor in Biology and Microscopy, School of Mines, Columbia College.

School of Mines, Columbia College, New York, N.Y.

KNOWLTON, FRANK H., M.S. Geology.

U.S. Geological Survey, Washington, D.C.

LANE, ALFRED CHURCH, A.M., Ph.D. Petrography and Geology.

Instructor in Petrography and Geology, Michigan Mining School, and Assistant on Michigan Geological Survey.

Houghton, Mich.

LEE, F. S., A.M., Ph.D. Physiology.

Associate in Physiology and Histology, Bryn Mawr College.

Bryn Mawr, Penn.

*LEE, LESLIE A., Ph.D. Geology and Biology.

Professor of Geology and Biology, Bowdoin College.

Brunswick, Me.

LEE, THOMAS G., M.D. Morphology.

Lecturer on Normal Histology and Embryology.

Yale University, New Haven, Conn.

- ***LIBBEY, WILLIAM, Jr., A.M., D.Sc.** Histology.
Professor of Physical Geography, Princeton College, and
Director of the E. M. Museum of Geology and Archae-
ology.
Princeton, N.J.
- LUCAS, FREDERIC A.** Avian Osteology.
Assistant Curator, Department of Comparative Anatomy,
U.S. National Museum.
Washington, D.C.
- ***MACCOSKIE, GEORGE, D.Sc., LL.D.** Biology.
Professor of Biology, Princeton College.
Princeton, N.J.
- MALL, F. P., M.D.** Histology and Vertebrate Embryology.
Associate Professor of Anatomy, Clark University.
Clark University, Worcester, Mass.
- MARK, EDWARD L., A.M., Ph.D.** Zoölogy.
Hersey Professor of Anatomy, Harvard University.
21 North avenue, Cambridge, Mass.
- ***MARSHALL, JOHN P., A.M.** Mineralogy and Geology.
Professor of Mineralogy and Geology, Tufts College.
College Hill, Mass.
- ***MARTIN, H. NEWELL, A.M., M.D., D.Sc., F.R.S.** Physiology.
Professor of Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- ***McGEE, W. J.** Geology.
Geologist, U.S. Geological Survey.
U.S. Geological Survey, Washington, D.C.
- McMURRICH, J. PLAYFAIR, A.M., Ph.D.** Animal Morphology.
Docent in Morphology, Clark University.
Clark University, Worcester, Mass.
- ***MEEHAN, THOMAS.**
Botanist to the Pennsylvania State Board of Agriculture;
Vice-President, Academy of Natural Sciences, Philadel-
phia.
Germantown, Penn.
- ***MERRIAM, C. HART, M.D.** Mammals and Birds.
Chief of Division of Economic Ornithology and Mammalogy
of the U.S. Department of Agriculture, and Secretary of
the American Ornithologists' Union.
Washington, D.C.

- *MERRILL, F. J. H., Ph.B. Geology.
Assistant State Geologist, State Museum.
Albany, N.Y.
- *MERRILL, GEORGE P., M.S. Lithology.
Curator of Lithology and Physical Geology, U.S. National
Museum.
National Museum, Washington, D.C.
- MILLS, T. WESLEY, M.D. Biology.
Professor of Physiology, McGill University.
Montreal, Canada.
- *MINOT, CHARLES SEDGWICK, S.B., S.D. Biology.
Assistant Professor of Embryology and Histology, Harvard
Medical School.
Harvard Medical School, Boston, Mass.
- MIXTER, SAMUEL J., B.S., M.D. Anatomy.
Demonstrator of Anatomy, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- MORGAN, THOS. HUNT, B.S., Ph.D. Animal Morphology.
Bruce Fellow, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- *MORSE, EDWARD S., Ph.D. Anthropology and Zoölogy.
Director of the Peabody Academy of Science, Salem, Mass.
Salem, Mass.
- *NEWBERRY, J. S., M.D., LL.D. Geology.
Professor of Geology, School of Mines, Columbia College.
School of Mines, Columbia College, New York, N.Y.
- NICHOLS, HERBERT, B.S. Psychology.
Fellow in Psychology, Clark University.
Clark University, Worcester, Mass.
- *NILES, WILLIAM H., Ph.B., A.M. Physical Geography and
Historical Geology.
Professor of Geology and Geography, Massachusetts Insti-
tute of Technology.
Massachusetts Institute of Technology, Boston, Mass.
- OLIVER, CHARLES A., A.M., M.D. Special Sense Morphology
and Physiology.
Surgeon to Wills Eye Hospital and Ophthalmic Surgeon to
the Presbyterian Hospital.
1507 Locust street, Philadelphia, Penn.

- ***OSBORN, HENRY FAIRFIELD, Sc.D.** Vertebrate Morphology.
Professor of Comparative Anatomy, Princeton College.
Princeton, N.J.
- ***PACKARD, A. S., A.M., M.D., Ph.D.** Zoölogy.
Professor of Zoölogy and Geology, Brown University.
Brown University, Providence, R.I.
- PARKER, GEORGE HOWARD, S.B.** Animal Morphology.
Instructor in Zoölogy, Harvard College.
8 Harris street, Cambridge, Mass.
- ***PEALE, A. C., A.M., M.D.** Geology.
Geologist, U.S. Geological Survey.
Geological Survey, Washington, D.C.
- ***PECKHAM, GEORGE W., M.D.** Biology.
Teacher of Biology, Milwaukee High School.
Milwaukee, Wis.
- PENFIELD, SAMUEL L., Ph.B.** Mineralogy.
Assistant Professor of Mineralogy, Yale University.
Peabody Museum, New Haven, Conn.
- ***PILLSBURY, J. H.** Biology.
Professor of Biology, Smith College.
Northampton, Mass.
- ***POWELL, J. W., Ph.D., LL.D.** Anthropology and Geology.
Director of the U.S. Geological Survey, and Director of the
Bureau of Ethnology, Smithsonian Institution.
Geological Survey, Washington, D.C.
- ***PRENTISS, A. N., S.M.** Botany.
Professor of Botany, Horticulture, and Arboriculture, Cor-
nell University.
Cornell University, Ithaca, N.Y.
- PROSSER, CHARLES S., S.M.** Geology and Palaeontology.
U.S. Geological Survey.
Washington, D.C.
- ***PUTNAM, FREDERICK W.** Archæology and Ethnology.
Peabody Professor of American Archæology and Ethnology,
Harvard University; Curator of the Peabody Museum of
Archæology and Ethnology, in connection with Harvard
University; Permanent Secretary of the American Associa-
tion for the Advancement of Science; Massachusetts
State Commissioner on Inland Fisheries; and President,
Boston Society of Natural History.
Peabody Museum, Cambridge, Mass.

- RANKIN, WALTER M., A.M., M.Sc., Ph.D.** Biology.
Instructor in Biology and Curator of Museum, Princeton College.
Princeton College, Princeton, N.J.
- *RATHBUN, RICHARD, S.M.** Invertebrates.
Curator, Dep't of Marine Invertebrates, National Museum.
U.S. National Museum, Washington, D.C.
- REICHART, EDWARD T., M.D.** Physiology.
Professor of Physiology, University of Pennsylvania.
University of Pennsylvania, Philadelphia, Penn.
- *RICE, WILLIAM NORTH, Ph.D., LL.D.** Geology.
Professor of Geology, Wesleyan University.
Middletown, Conn.
- *RILEY, C. V., A.M., Ph.D.** Entomology, Mycology.
Entomologist of the U.S. Department of Agriculture, and
Curator of Insects, U.S. National Museum.
1700 13th street, N.W., Washington, D.C.
- *ROTHROCK, J. T., M.D., B.S.** Botany.
Professor of Botany, University of Pennsylvania.
West Chester, Chester Co., Penn.
- *RUSSELL, ISRAEL C.** Geology.
U.S. Geological Survey, Washington, D.C.
- *SARGENT, CHARLES S.** Botany.
Professor of Arboriculture, Harvard University, and Director of the Arnold Arboretum.
Brookline, Mass.
- *SCOTT, WILLIAM B., Ph.D.** Animal Morphology.
Professor of Geology and Palaeontology, Princeton College.
Princeton, N.J.
- *SCUDDER, S. H., A.M., S.B.** Entomology and Palaeontology.
Palaeontologist, U.S. Geological Survey.
Cambridge, Mass.
- *SEDWICK, WILLIAM T., Ph.D.** Biology.
Associate Professor of Biology, Massachusetts Institute of Technology.
Massachusetts Institute of Technology, Boston, Mass.
- SHALER, N. S., A.M., S.D.** Palaeontology.
Professor of Geology, Harvard College, and Geologist, U.S. Geological Survey.
Cambridge, Mass.

- *SHARP, BENJAMIN, M.D., Ph.D. Animal Morphology.
 Professor of Invertebrate Zoölogy, Academy of Natural Sciences of Philadelphia.
Academy of Natural Sciences, Philadelphia, Penn.
- *SHUFELDT, R. W., M.D., C.M.Z.S. Anatomy of Vertebrates.
 Captain, Medical Department, U.S.A.
Care of Smithsonian Institution, Washington, D.C.
- SMITH, JOHN B. Entomology.
 Rutgers College.
New Brunswick, N.J.
- SMITH, ROBERT MEADE, A.M., M.D. Physiology.
 Professor of Comparative Physiology, University of Pennsylvania.
332 South Twenty-first street, Philadelphia, Penn.
- *SMITH, SIDNEY I., Ph.D. Biology.
 Professor of Comparative Anatomy, Yale University.
147 Whalley avenue, New Haven, Conn.
- TILTON, JOHN L., A.B. Biology.
 Professor of Natural Science, Simpson Centenary College.
Indianola, Ia.
- *TRUE, FREDERICK W., M.S. Vertebrates.
 Curator of Mammals, U.S. National Museum.
National Museum, Washington, D.C.
- TUCKERMAN, FREDERICK, M.D., B.Sc. Anatomy.
Amherst, Mass.
- TUTTLE, ALBERT H. Biology.
 Professor of Biology, University of Virginia, Va.
University of Virginia, Va.
- *TYLER, J. M., A.B. Zoölogy.
 Professor of Zoölogy and Botany, Amherst College.
Amherst, Mass.
- *VAN VLECK, B. H., S.B. Biology.
 Instructor in Biology and Physiology in Boston University.
Boston Society of Natural History, Boston, Mass.
- VERRILL, A. E., A.M. Zoölogy.
 Professor of Zoölogy, Yale University.
86 Whalley avenue, New Haven, Conn.

- *WADSWORTH, M. E., A.M., Ph.D. Mineralogy, Petrography, and Geology.
Director of the Michigan Mining School, and Professor of Mineralogy, Petrography, and Geology; also State Geologist of Michigan.
Michigan Mining School, Houghton, Mich.
- *WALCOTT, C. D. Palaeontology and Geology.
Palaeontologist, U.S. Geological Survey, and Hon. Curator of Invertebrate Palaeozoic Fossils, U.S. National Museum.
National Museum, Washington, D.C.
- WARD, HENRY A., A.M. Natural Science.
Head of Ward's Natural Science Establishment.
No. 16 to 26 College avenue, Rochester, N.Y.
- *WARREN, J. W., A.B., M.D. Physiology.
Instructor in Physiology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- WATASE, S., B.S., Ph.D. Biology.
Assistant and lecturer in Zoölogy, Clark University.
Clark University, Worcester, Mass.
- WHEELER, WILLIAM M. Embryology.
Fellow in Morphology, Clark University.
Clark University, Worcester, Mass.
- WHITE, CHARLES D., B.S. Palaeobotany and Geology.
Assistant Palaeontologist, U.S. Geological Survey.
U.S. National Museum, Washington, D.C.
- WHITFIELD, R. P., M.A. Palaeontology.
(Late Professor at Troy, N.Y.) Curator of Geology and Conchology, American Museum of Natural History.
American Museum of Natural History, 77th street and 8th avenue, New York, N.Y.
- *WHITMAN, C. O., A.M., Ph.D. Animal Morphology.
Editor, "Journal of Morphology;" Director of the Marine Biological Laboratory, Wood's Holl, Mass.; Professor of Morphology, Clark University.
Worcester, Mass.
- *WILDER, BURT G., B.S., M.D. Vertebrate Morphology.
Professor of Physiology, Comparative Anatomy, and Zoölogy, and Curator of Vertebrate Museum, Cornell University.
Cornell University, Ithaca, N.Y.

- *WILLIAMS, HENRY S., Ph.D. Geology and Palæontology.
 Professor of Geology and Palæontology, Cornell University,
 and Assistant Geologist, U.S. Geological Survey.
Cornell University, Ithaca, N.Y.
- WILLISTON, SAMUEL W., M.D., Ph.D. Anatomy.
 Assistant Professor of Anatomy, Yale University.
New Haven, Conn.
- *WILSON, EDMUND B., Ph.B., Ph.D. Animal Morphology.
 Professor of Biology, Bryn Mawr College, Penn.
Bryn Mawr, Penn.
- WILSON, HENRY V., A.B., Ph.D. Zoölogy.
 Resident Naturalist at U.S. Fish Commission, Wood's Holl.
Wood's Holl, Mass.
- WILSON, W. P., B.S., D.Sc. Botany.
 Professor of Physiological Botany, Department of Biology,
 University of Pennsylvania.
Philadelphia, Penn.
- WINCHELL, ALEXANDER, LL.D. Geology.
 Professor of Geology and Palæontology, University of Michigan.
Ann Arbor, Mich.
- WOODWORTH, WILLIAM M., A.B., A.M. Zoölogy.
 Assistant in Microscopical Anatomy, Harvard University.
149 Brattle street, Cambridge, Mass.
- WOLFF, JOHN E., A.B. Petrography.
 Instructor in Petrography, Harvard University.
15 Story street, Cambridge, Mass.
- *WRIGHT, R. RAMSAY, A.M., B.Sc. Zoölogy.
 Professor of Natural History, University College, Toronto,
 Canada.
University College, Toronto, Canada.
- YOUNMANS, W. J., M.D. Biology.
 Editor of "Popular Science Monthly."
Office of "Popular Science Monthly," Bond street, New York, N.Y.

Number of honorary members	4
" " members	160
Total	164

NINTH MEETING, AT BOSTON.

DECEMBER 31, 1890.

PHYSIOLOGICAL LECTURE-ROOM, HARVARD MEDICAL SCHOOL.

MORNING SESSION, 10 A.M.

President Martin in the chair.

Thirty members present.

The President appointed —

W. H. BREWER,
 J. H. PILLSBURY,
 E. A. ANDREWS,

a committee to nominate the officers for the ensuing year.

The Treasurer's report was then read.

THE AMERICAN SOCIETY OF NATURALISTS, IN ACCOUNT
WITH WILLIAM T. SEDGWICK, TREASURER.

Balance as per report of December, 1889	\$704 20
Dues received to Dec. 30, 1890	148 00
Total	\$852 20
Deduct expenses	162 43
Balance on hand, Dec. 31, 1890	\$689 77

EXPENSES.

1890.	
Jan. 8.	Paid W. N. Rice, expenses Science Committee
	\$15 49
Oct. 2.	" Rockwell & Churchill for printing —
	a. President's address
	17 34
	b. Records
	63 05
	c. Pamphlets on Science Teaching
	20 34
	<i>Amount carried forward</i>
	\$116 22

<i>Amount brought forward</i>	.	.	.	\$116 22
Oct. 9. Paid Thomas Todd, printing notices of dues, and receipts for same . . .				5 00
" 13. " H. H. Donaldson, Secretary, expenses of New York meeting . . .				13 11
Dec. 30. " Rockwell & Churchill, printing circulars for Science Committee . . .				22 00
" Treasurer for postage and envelopes,				6 10
				\$162 43
Total expense				

Respectfully submitted,

Wm. T. SEDGWICK,
Treasurer.

The President appointed

E. L. MARK,
T. WESLEY MILLS,

a committee to audit the report.

They found the same correct, and it was accepted by the Society.

The Nominating Committee recommended the following officers for the ensuing year:—

President. — Wm. NORTH RICE.

Vice-Presidents. — SAMUEL F. CLARKE,
T. WESLEY MILLS,
C. O. WHITMAN.

Secretary. — HENRY H. DONALDSON.

Treasurer. — WILLIAM T. SEDGWICK.

Members of the Executive Committee elected from the Society at large. — HENRY F. OSBORN,
RICHARD RATHBUN.

The nominees were duly elected.

In behalf of the Committee on Science Teaching in the Schools, Prof. Wm. North Rice gave a verbal statement of the proceedings of the committee during the past year, and Prof. Henry F. Osborn read the report which follows:—

REPORT OF THE COMMITTEE ON SCIENCE
TEACHING IN THE SCHOOLS.

DECEMBER, 1890.

The Committee beg leave to submit the following report:—

At a meeting of the Committee, held in New Haven, in March, there were present Professors Clarke, Osborn, and Rice.

A preliminary draft of an address to the Colleges on the requirement of Natural Science for admission was agreed upon, copies of which were subsequently sent to the other members of the Committee for criticism.

Prof. S. I. Smith, of Yale University, was elected a member of the Committee, and he has accepted the election.

A second meeting was held in Boston, in July, at which were Professors Clarke, Farlow, Goodale, and Rice. It was there moved by Professor Goodale, and carried, that Prof. William North Rice be asked to edit a text-book of Natural Science, of the general scope outlined in the presidential address of last year. It was the belief of the Committee that if a considerable part of the book should be written by the editor himself, and the remainder by persons in consultation with him, a higher degree of symmetry and unity could be secured in the work than by the original plan of having the various parts written independently by a considerable number of writers, subject only to some editorial revision. It was believed that an arrangement could be made for the submission of various parts of the book (in manuscript or in proof) to a number of specialists of acknowledged authority for revision; and that thereby a truly authoritative character could be secured for the book without sacrificing its unity of plan.

It was voted to ask Professor Rice to draw up a table of contents of the book, to be submitted to the Society at the Annual Meeting. Such a draft has been prepared, and is submitted in print. It is understood that a leading publisher is desirous of undertaking the publication of such a book. While the majority

of the Committee (at least so far as there has been an opportunity to learn their opinion) believe that the publication of the book will be serviceable to our cause, it is a question whether the Society should assume any further responsibility than is involved in an expression of approval of the general design.

The address to the Colleges has been completed and adopted by the Committee; and, as authorized by the Executive Committee of the Society, there have been printed seven hundred and fifty copies.

There have also been printed under the same authorization seven hundred and fifty copies of a letter to the presidents of the Colleges; these, together with the two reports of the Committee and the last President's address, accompany the address to the Colleges.

These are ready to be mailed, and will be sent out, after the busy time of the holidays is past, to the nearly four hundred Universities and Colleges of the country.

The address has already been published, and commented on by a number of the daily papers, and it will appear in the next numbers of the "Academy" and of the "Educational Review."

A place on the programme of the American Institute of Instruction, at its meeting in Saratoga, in last July, was given to a member of the Committee, who discussed the place of Natural Science in the Educational Course.

A very cordial invitation was sent to the Committee to appear before the Convention of College Officers of Ohio, at Cleveland, in the week following Christmas, and as that is not possible, the subject will be presented by Prof. F. P. Whitman, of Adelbert College, to whom the Committee would express their grateful acknowledgments.

The Committee believe that the cause of science in the schools is making progress. In all educational circles the subject is attracting increased interest. A very gratifying evidence of sympathy with the views of the Society is to be found in the unanimous adoption, by the Association of Colleges in New England, of the following resolution, moved by President Eliot, of Harvard, and seconded by President Carter, of Williams: —

"The Association of Officers of Colleges in New England desires to support the endeavor of the American Society of

Naturalists to introduce instruction in Natural Science into schools; and the Association agrees with the Society in thinking it indispensable that the methods of instruction should invariably be demonstrative."

SAMUEL F. CLARKE,
WILLIAM G. FARLOW,
GEORGE L. GOODALE,
GEORGE MACLOSKIE,
HENRY F. OSBORN,
WM. NORTH RICE,
WM. T. SEDGWICK,
SIDNEY I. SMITH,
C. O. WHITMAN.

The report was accepted, and the Committee continued; but it was the sense of the meeting that the Society should not formally recommend any particular book, although they did wish to support the efforts of their Committee.

To meet this situation Prof. W. H. Brewer introduced the following resolution:—

Resolved, That this Society recommends that instruction in Elementary Science, following some such general plan as that reported by the Committee, be given in the secondary schools.

This motion was adopted.

The Committee on the "Journal of Morphology" made the following report:—

The Committee on the "Journal of Morphology" beg leave to report that of the ten (10) copies of the "Journal" purchased by the Society, five (5) copies have been given away to secure subscriptions to the "Journal." The Committee asks the authorization of the Society to use the remaining copies in securing subscriptions from *individuals*, in case it seems to them improbable that the desired number of *institutions* will accept the terms offered by the Society.

E. L. MARK,
W. T. SEDGWICK,
ALPHEUS HYATT.

The report was accepted, and the Committee continued.

Papers were then presented by

PROFESSOR PILLSBURY: A New Scheme of Color Nomenclature.

DR. JACKSON: Methods in Museum Work.

PROF. B. G. WILDER: New Methods of Preparing Sheep's Brains and Cats for Practicums.

DR. G. BAUR: Ideas on the Origin of the Galapagos Islands.

Professor Farlow then gave notice that he would be happy to show the new botanical laboratories at Cambridge to any members who desired to see them, and who would visit him there on the morning of January 1.

The meeting then adjourned, to reassemble in the same place at 2.30 P.M.

AFTERNOON SESSION.

Professor Martin in the chair; thirty members present. The following gentlemen, whose names had been posted in the morning, were elected to membership:—

JOHN C. BRANNER,
CHAS. B. DAVENPORT,
CHAS. L. EDWARDS,
FREDERIC GARDINER,
F. H. HERRICK,
C. F. HODGE,
H. P. JOHNSON,

F. P. MALL,
ALFRED C. LANE,
THOS. H. MORGAN,
HERBERT NICHOLS,
WM. M. WHEELER,
H. V. WILSON,
WM. M. WOODWORTH.

The Society then proceeded to consider the topic, "The Inheritance of Acquired Characteristics," which had been chosen for discussion. The papers were as follows:—

PROF. H. F. OSBORN: Are Acquired Variations inherited?

PROF. W. H. BREWER: The Inheritance of Acquired Characters.

Prof. Wm. G. Farlow spoke on the question from the botanical standpoint.

Prof. W. K. Brooks, who was expected to speak, was unable to be present, but sent the manuscript of his paper. It was decided, however, that, owing to the difficulty of reading it

properly, the lateness of the hour, and strong probability that some arrangement would be made for the publication of all the papers, this paper should be omitted, and the Society proceeded at once to the discussion of the papers which had been read.

It was resolved that the Executive Committee be requested to take measures to secure the publication of the papers on "The Inheritance of Acquired Characteristics."

The Secretary was instructed to tender the thanks of the Society to the authorities of the Harvard Medical School and the St. Botolph Club for their kindness and hospitality during the present meeting.

The Society then adjourned, to meet at time and place to be hereafter determined by the Executive Committee.

HENRY H. DONALDSON,
Secretary.





R E C O R D S
OF THE
AMERICAN SOCIETY
OF
NATURALISTS.

VOLUME I.

PART NINE.

BOSTON:
PUBLISHED BY THE SECRETARY.
1892.

R E C O R D S .

LIST OF OFFICERS FOR 1892.

President, HENRY F. OSBORN.
Vice-Presidents, { SAMUEL F. CLARKE,
 { GEORGE BAUR,
 { WILLIAM H. DALL.
Secretary, THOMAS H. MORGAN.
Treasurer, WILLIAM T. SEDGWICK.

*Members of the Executive Committee elected from the
Society at large.*

J. PLAYFAIR McMURRICH. W. P. WILSON.

LIST OF HONORARY MEMBERS.

***DANA, JAMES D., Ph.D., LL.D.**, Mineralogy, Zoölogy, Geology.
 Professor of Geology, Yale University.
Yale University, New Haven, Conn.

LESLEY, J. P., A.M., LL.D. Geology.
 State Geologist of Pennsylvania.
907 Walnut street, Philadelphia, Penn.

MARSH, O. C., Ph.D., LL.D. Palæontology.
 Professor of Palæontology, Yale University.
8 Peabody Museum, New Haven, Conn.

LIST OF MEMBERS.

[An asterisk designates original membership.]

- ***ALLEN, HARRISON, M.D.** Comparative Anatomy.
1933 Chestnut street, Philadelphia, Penn.
- ALLEN, J. A., Ph.D.** Mammalogy and Ornithology.
Curator of the Department of Vertebrate Zoölogy, Ameri-
can Museum of Natural History, New York.
American Museum of Natural History.
77th street and 8th avenue, New York, N.Y.
- ALLIS, EDWARD P., Jr.** Biology.
Associate Editor of the "Journal of Morphology."
Milwaukee, Wis.
- ANDREWS, E. A., Ph.D.** Biology.
Associate in Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- BARTON, B. W., M.D.** Botany.
Instructor in Botany, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- BAUR, GEORGE, Ph.D.** Vertebrate Palaeontology.
Docent in Comparative Osteology and Palaeontology, Clark
University.
Clark University, Worcester, Mass.
- ***BICKMORE, ALBERT S.**
Secretary and Professor in charge of Department of Public
Instruction of the American Museum of Natural History.
American Museum, Central Park, N.Y.
- BIGELOW, R. P., S.B.** Animal Morphology.
Bruce Fellow, Johns Hopkins University.
1501 Eighteenth street, Washington, D.C.

- BOLTON, H. CARRINGTON, A.M., Ph.D. Mineralogy, Chemistry.
University Club, New York City.
- *BOWDITCH, HENRY P., A.M., M.D. Physiology.
 Professor of Physiology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- BRANNER, JOHN CASPER, A.M., Ph.D. Geology.
 State Geologist.
Little Rock, Arkansas.
- BREWER, WILLIAM H., Ph.D. Biology.
 Professor of Agriculture, Yale University.
246 Orange street, New Haven, Conn.
- *BRUSH, G. J. Mineralogy.
 Director, Sheffield Scientific School.
New Haven, Conn.
- BUMPUS, H. C., Ph.D. Zoölogy.
 Associate Professor of Zoölogy, Brown University.
Brown University, Providence, R.I.
- CAMPBELL, JOHN P., Ph.D. Physiology.
 Professor of Biology, University of Georgia, Athens, Ga.
- CASEY, THOMAS L. Entomology.
 Captain, U.S. Engineer Corps.
U.S. Army Building, New York, N.Y.
- CHITTENDEN, R. H., Ph.D. Physiology.
 Professor of Physiological Chemistry, Yale University.
83 Trumbull street, New Haven, Conn.
- CLARK, WILLIAM B., Ph.D. Palæontology.
 Associate in Palæontology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- *CLARKE, SAMUEL F., Ph.B., Ph.D. Zoölogy.
 Professor of Natural History, Williams College.
Williamstown, Mass.
- *CONN, H. W., Ph.D. Assistant Professor of Biology, Wesleyan University.
Middletown, Conn.
- *COPE, EDWARD D. Vertebrate Palæontology and Zoölogy.
2102 Pine street, Philadelphia, Penn.
- *COUES, ELLIOTT, A.M., M.D., Ph.D. Vertebrates, Bibliography.
Smithsonian Institution, Washington, D.C.

- DALL, WILLIAM HEALEY,** Mollusca, Palæontology.
 Palæontologist, U.S. Geological Survey, Honorary Curator,
 Department of Mollusks, U.S. National Museum.
Smithsonian Institution, Washington, D.C.
- DANA, EDWARD S., Ph.D.**
 Assistant Professor of Natural Philosophy, Yale University.
111 Grove street, New Haven, Conn.
- DAVENPORT, CHARLES B., A.B., A.M.** Zoölogy.
 Assistant in Zoölogy, Harvard University.
Cambridge, Mass.
- ***DAVIS, WILLIAM M., S.B., M.E.** Geology, Geography, and
 Meteorology.
 Assistant Professor of Physical Geography, Harvard Uni-
 versity.
Museum of Comparative Zoölogy, Cambridge, Mass.
- ***DEWEY, FREDERIC P., Ph.B.** Metallurgy.
 Curator of Metallurgy, U.S. National Museum.
621 F street N.W., Washington, D.C.
- ***DILLER, J. S., S.B.** Petrography and Geology.
 Assistant Geologist in Charge of Petrographic Laboratory.
U.S. Geological Survey, Washington, D.C.
- ***DIMMOCK, GEORGE, Ph.D.** Zoölogy.
Canobie Lake, N.H.
- DOLLEY, CHARLES S.** Biology.
 Professor of General Biology in the University of Pennsylva-
 nia; Professor of Natural History in Swarthmore College.
*University of Pennsylvania, Biological Department,
 Philadelphia, Penn.*
- ***DONALDSON, HENRY H., Ph.D.** Zoölogy.
 Assistant Professor of Neurology, Clark University.
Worcester, Mass.
- ***DUDLEY, WILLIAM R., M.S.** Cryptogamic Botany.
 Assistant Professor of Cryptogamic Botany, Cornell Univer-
 sity.
Cornell University, Ithaca, N.Y.
- ***DUTTON, C.E.** Geology.
 Captain of Ordnance, U.S.A.
U.S. Geological Survey, Washington, D.C.

- DWIGHT, THOMAS, A.M., M.D. Anatomy.
 Parkman Professor of Anatomy, Harvard Medical School.
235 Beacon street, Boston, Mass.
- *DWIGHT, WILLIAM B., A.B., A.M., Ph.B. Palæontology.
 Professor of Natural History and Curator of the Museum,
Vassar College.
Vassar College, Poughkeepsie, N.Y.
- EDWARDS, CHAS. L., A.M., Ph.D. Zoölogy.
 Fellow in Morphology, Clark University.
Clark University, Worcester, Mass.
- *EMERSON, B. K., Ph.D. Geology and Mineralogy.
 Professor of Geology, Amherst College.
Amherst, Mass.
- *EMERTON, JAMES H. Zoölogy.
11 St. James avenue, Boston, Mass.
- *EMMONS, S. F. Geology.
 Geologist of the U.S. Geological Survey.
Geological Survey, Washington, D.C.
- ERNST, HAROLD C., A.M., M.D. Bacteriology.
 Demonstrator of Bacteriology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- *FARLOW, WM. G., A.B., M.D. Botany.
 Professor of Cryptogamic Botany, Harvard University.
Harvard University, Cambridge, Mass.
- *FERNALD, C. H., A.M., Ph.D. Microlepidoptera.
 Professor of Zoölogy, Mass. Agricultural College.
Amherst, Mass.
- FERNALD, HENRY T., M.S., Ph.D. Morphology.
 Professor of Zoölogy, Pennsylvania State College.
State College, Centre Co., Penn.
- FEWKES, J. WALTER. Secretary, Boston Society of Natural History; Assistant,
 Museum of Comparative Zoölogy.
Museum of Comparative Zoölogy, Cambridge, Mass.
- FOX, L. WEBSTER, M.D. Anatomy and Physiology.
 Clinical Assistant, Jefferson Medical College Hospital,
 Ophthalmic Surgeon to Germantown Hospital.
1304 Walnut street, Philadelphia, Penn.

- FULLER, GEORGE W., S.B.** Bacteriology.
 Chief Assistant-Biologist, State Board of Health of Massachusetts.
Lawrence, Mass.
- ***GAGE, SIMON H., S.B.** Vertebrate Morphology and Physiology.
 Associate Professor of Physiology and Lecturer on Microscopical Technology, Cornell University.
Cornell University, Ithaca, N.Y.
- GANONG, WM. FRANCIS.** Biology.
119 Oxford street, Cambridge, Mass.
- GARDINER, EDWARD G., S.B., Ph.D.** Zoölogy.
 Instructor in Biology, Massachusetts Institute of Technology.
131 Mt. Vernon street, Boston, Mass.
- GARDINER, FREDERIC, A.B.** Biology.
 Instructor in Natural Science, Trinity College.
Pomfret, Conn.
- ***GERRISH, FREDERIC HENRY, A.M., M.D.** Anatomy.
 Professor of Anatomy, Bowdoin College.
675 Congress street, Portland, Me.
- ***GILBERT, G. K.** Geology.
 Geologist of the U.S. Geological Survey.
U.S. Geological Survey, Washington, D.C.
- ***GOODALE, GEORGE L., A.M., M.D.** Botany.
 Professor of Botany, Harvard University.
Harvard University, Cambridge, Mass.
- ***GOODR, G. BROWN, A.M., Ph.D.** Zoölogy.
 Assistant Secretary of the Smithsonian Institution in charge
 of the U.S. National Museum.
Smithsonian Institution, Washington, D.C.
- GRATACAP, L. P., M.A., Ph.B.** Mineralogy and Geology.
 Assistant Curator of Geology, American Museum of Natural
 History, New York.
77th street and 8th avenue, New York, N.Y.
- ***GREENLEAF, R.W., A.M., M.D.** Botany.
561 Boylston street, Boston, Mass.
- GREGORY, EMILY L., Ph.D.** Botany.
343 Madison avenue, New York, N.Y.
- HAGUE, ARNOLD.** Geology and Petrography.
 Geologist, U.S. Geological Survey.
Geological Survey, Washington, D.C.

- ***HALL, JAMES M. S., A.M., M.D., LL.D.** Geology, Palæontology.
 State Geologist of New York, Director of the State Museum
 of Natural History.
State Museum, Albany, N.Y.
- HARE, HOBART AMORY, B.Sc., M.D.** Physiology.
 Demonstrator of Experimental Therapeutics in the Medical
 Department, and Instructor in Physiology in the Biological
 Department of the University of Pennsylvania.
117 South Twenty-second street, Philadelphia, Penn.
- HARGITT, CHARLES W., Ph.D.** Zoölogy.
 Professor of Biology, Syracuse University.
Syracuse University, Syracuse, N.Y.
- ***HEILPRIN, ANGELO.** Palæontology and Geology.
 Professor of Invertebrate Palæontology at, and Curator in
 Charge of, the Academy of Natural Sciences of Philadelphia, and Professor of Geology at the Wagner Free
 Institute of Science.
Academy of Natural Sciences, Philadelphia, Penn.
- ***HENSHAW, SAMUEL.** Zoölogy.
 Assistant, Boston Society of Natural History.
Boston Society of Natural History, Boston, Mass.
- HERRICK, F. H., A.B., Ph.D.** Biology.
 Professor of Biology, Adelbert College.
Adelbert College, Cleveland, O.
- HILL, FRANK A.** Geology.
 Geologist in Charge, Anthracite District, State Survey of
 Pennsylvania.
Dunbar, Fayette Co., Penn.
- HILL, ROBERT T.** Palæontology.
 School of Geology, University of Texas.
Austin, Texas.
- ***HITCHCOCK, C. H., Ph.D.** Geology.
 Professor of Geology and Mineralogy, Dartmouth College.
Hanover, N.H.
- HODGE, CLIFTON F., A.B., Ph.D.** Physiology.
 Instructor in Biology, University of Wisconsin.
University of Wisconsin, Madison, Wis.

- HOWELL, WILLIAM H., A.B., Ph.D. Physiology.
 Professor of Physiology, University of Michigan.
57 E. University avenue, Ann Arbor, Mich.
- HUNT, T. STERRY, A.M., LL.D. Mineralogy and Geology.
Care Mr. James Douglas, Spuyten Duyvil, N.Y.
- *HYATT, ALPHEUS, S.B. Palaeontology and Zoölogy.
 Curator of the Boston Society of Natural History, and Assistant in Museum of Comparative Zoölogy, at Cambridge, Mass.
Boston Society of Natural History, Boston, Mass.
- IDDINGS, JOSEPH P., Ph.B. Geology and Petrography.
 Geologist, U.S. Geological Survey.
Washington, D.C.
- IVES, J. E. Invertebrate Zoölogy.
 Assistant to the Curator in Charge of the Academy of Natural Sciences of Philadelphia.
Academy of Natural Sciences, Philadelphia, Pa.
- JACKSON, ROBERT TRACY, S.B., S.D. Zoölogy and Palaeontology.
33 Gloucester street, Boston, Mass.
- JAYNE, HORACE, M.D. Vertebrata.
 Professor of Vertebrate Morphology, University of Pennsylvania.
1826 Chestnut street, Philadelphia, Penn.
- JEFFRIES, J. AMORY, A.B., M.D. Anatomy.
3 Exeter street, Boston, Mass.
- JOHNSON, HERBERT P., A.M. Biology.
 Fellow in Morphology, Clark University.
Worcester, Mass.
- JORDAN, DAVID STARR. Biology.
 President of Leland Stanford Jr. University. Palo Alto, Cal.
Palo Alto, Cal.
- JORDAN, EDWIN O., S.B. Biology.
 Fellow in Morphology, Clark University.
Clark University, Worcester, Mass.
- *JULIEN, ALEXIS A., Ph.D. Biology and Petrography.
 Instructor in Biology and Microscopy, School of Mines, Columbia College.
School of Mines, Columbia College, New York, N.Y.

- KNOWLTON, Frank H., M.S.** Geology.
U.S. Geological Survey, Washington, D.C.
- LANE, ALFRED CHURCH, A.M., Ph.D.** Petrography and Geology.
 Instructor in Petrography and Geology, Michigan Mining School, and Assistant on Michigan Geological Survey.
Houghton, Mich.
- LEE, F. S., A.M., Ph.D.** Physiology.
 Demonstrator of Physiology, Columbia College, Medical Department.
College of Physicians and Surgeons, New York City.
- ***LEE, LESLIE A., Ph.D.** Geology and Biology.
 Professor of Geology and Biology, Bowdoin College.
Brunswick, Me.
- LEE, THOMAS G., M.D.** Morphology.
 Lecturer on Normal Histology and Embryology.
Yale University, New Haven, Conn.
- ***LIBBEY, WILLIAM, Jr., A.M., D.Sc.** Histology.
 Professor of Physical Geography, Princeton College, and Director of the E. M. Museum of Geology and Archæology.
Princeton, N.J.
- LUCAS, FREDERIC A.** Avian Osteology.
 Assistant Curator, Department of Comparative Anatomy,
 U.S. National Museum.
Washington, D.C.
- ***MACCOSKIE, GEORGE, D.Sc., LL.D.** Biology.
 Professor of Biology, Princeton College.
Princeton, N.J.
- MALL, F. P., M.D.** Histology and Vertebrate Embryology.
 Associate Professor of Anatomy, Clark University.
Clark University, Worcester, Mass.
- MARK, EDWARD L., A.M., Ph.D.** Zoölogy.
 Hersey Professor of Anatomy, Harvard University.
21 North avenue, Cambridge, Mass.
- ***MARSHALL, JOHN P., A.M.** Mineralogy and Geology.
 Professor of Mineralogy and Geology, Tufts College.
College Hill, Mass.

- *MARTIN, H. NEWELL, A.M., M.D., D.Sc., F.R.S. Physiology.
Professor of Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- McCLURE, CHARLES F. W., A.B. Embryology and Vertebrate Morphology.
Instructor in Biology at Princeton College.
Princeton, N.J.
- *McGEE, W. J. Geology.
Geologist, U.S. Geological Survey.
U.S. Geological Survey, Washington, D.C.
- McLAUTHLIN, GEORGE V., S.B. Biology.
Assistant in Biology, Massachusetts Institute of Technology.
Massachusetts Institute of Technology, Boston, Mass.
- McMURRICH, J. PLAYFAIR, A.M., Ph.D. Animal Morphology.
Professor of Biology, University of Cincinnati.
Cincinnati, Ohio.
- *MEEHAN, THOMAS. Botany.
Botanist to the Pennsylvania State Board of Agriculture;
Vice-President, Academy of Natural Sciences, Philadelphia.
Germantown, Penn.
- *MERRIAM, C. HART, M.D. Mammals and Birds.
Chief of Division of Economic Ornithology and Mammalogy
of the U.S. Department of Agriculture, and Secretary of
the American Ornithologists' Union.
Washington, D.C.
- *MERRILL, F. J. II., Ph.D. Geology.
Assistant State Geologist, State Museum.
Albany, N.Y.
- *MERRILL, GEORGE P., M.S. Lithology.
Curator of Lithology and Physical Geology, U.S. National
Museum.
National Museum, Washington, D.C.
- MILLS, T. WESLEY, M.D. Biology.
Professor of Physiology, McGill University.
Montreal, Canada.
- *MINOT, CHARLES SEDGWICK, S.B., S.D. Biology.
Assistant Professor of Embryology and Histology, Harvard
Medical School.
Harvard Medical School, Boston, Mass.

- MIXTER, SAMUEL J., B.S., M.D. Anatomy.
 Demonstrator of Anatomy, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- MORGAN, THOS. HUNT, B.S., Ph.D. Animal Morphology.
 Professor of Biology, Bryn Mawr College.
Bryn Mawr, Penn.
- *MORSE EDWARD S., Ph.D. Anthropology and Zoölogy.
 Director of the Peabody Academy of Science, Salem, Mass.
Salem, Mass.
- *NEWBERRY, J. S., M.D., LL.D. Geology.
 Professor of Geology, School of Mines, Columbia College.
65 Grove street, New Haven, Conn.
- NICHOLS, HERBERT, Ph.D. Psychology.
 Assistant in Psychology, Harvard University.
12 Kirkland place, Cambridge, Mass.
- *NILES, WILLIAM H., Ph.B., A.M. Physical Geography and
 Historical Geology.
 Professor of Geology and Geography, Massachusetts Institute of Technology.
Massachusetts Institute of Technology, Boston Mass.
- OLIVER, CHARLES A., A.M., M.D. Special Sense Morphology and Physiology.
 Surgeon to Wills Eye Hospital and Ophthalmic Surgeon to the Presbyterian Hospital.
1507 Locust street, Philadelphia, Penn.
- *OSBORN, HENRY FAIRFIELD, Sc.D. Vertebrate Morphology.
 Da Costa Professor of Biology, Columbia Collage, Curator of Department of Mammalian Palæontology, American Museum of Natural History, N.Y.
American Museum of Natural History, New York City.
- *PACKARD, A. S., A.M., M.D., Ph.D. Zoölogy.
 Professor of Zoölogy and Geology, Brown University.
Brown University, Providence, R.I.
- PARKER, GEORGE HOWARD, S.B. Animal Morphology.
 Instructor in Zoölogy, Harvard College.
8 Harris street, North Cambridge, Mass.
- *PEALE, A. C., A.M., M.D. Geology.
 Geologist, U.S. Geological Survey.
Geological Survey, Washington, D.C.

- REICHART, EDWARD T., M.D.** Physiology.
 Professor of Physiology, University of Pennsylvania.
University of Pennsylvania, Philadelphia, Penn.
- *RICE, WILLIAM NORTH, Ph.D., LL.D.** Geology.
 Professor of Geology, Wesleyan University.
Middletown, Conn.
- *RILEY, C. V., A.M., Ph.D.** Biology.
 Entomologist of the U.S. Department of Agriculture, and
 Curator of Insects, U.S. National Museum.
Sunbury, Wyoming ave., Washington, D.C.
- *ROTHROCK, J. T., M.D., B.S.** Botany.
 Professor of Botany, University of Pennsylvania.
West Chester, Chester Co., Penn.
- *RUSSELL, ISRAEL C.** Geology.
U.S. Geological Survey, Washington, D.C.
- RYDER, JOHN A., Ph.D.** Embryology.
 Professor of Comparative Embryology, University of Pennsylvania.
Philadelphia, Penn.
- *SARGENT, CHARLES S.** Botany.
 Professor of Arboriculture, Harvard University, and Director of the Arnold Arboretum.
Brookline, Mass.
- *SCOTT, WILLIAM B., Ph.D.** Animal Morphology.
 Professor of Geology and Palæontology, Princeton College.
Princeton, N. J.
- *SCUDDER, S. H., A.M., S.B.** Entomology and Palæontology.
 Palæontologist, U.S. Geological Survey.
Cambridge, Mass.
- *SEDGWICK, WILLIAM T., Ph.D.** Biology.
 Professor of Biology, Massachusetts Institute of Technology,
 Chief Biologist of the State Board of Health of Massachusetts.
Massachusetts Institute of Technology, Boston, Mass.
- SETCHELL, WILLIAM A., A.B., Ph.D.** Botany.
 Assistant in Biology, Yale University.
Yale University, New Haven, Conn.

- SHALER, N. S., A.M., S.D.** Palæontology.
 Professor of Geology, Harvard College, and Geologist, U.S.
 Geological Survey.
Cambridge, Mass.
- ***SHARP, BENJAMIN, M.D., Ph.D.** Animal Morphology.
 Professor of Invertebrate Zoölogy, Academy of Natural
 Sciences of Philadelphia.
Academy of Natural Science, Philadelphia, Penn.
- ***SHUFELDT, R. W., M.D., C.M.Z.S.** Anatomy of Vertebrates.
 Captain, Medical Department, U.S.A.
Care of Smithsonian Institution, Washington, D.C.
- SMITH, JOHN B.** Entomology.
 Rutgers College.
New Brunswick, N.J.
- SMITH, ROBERT MEADE, A.M., M.D.** Physiology.
 Professor of Comparative Physiology, University of Penn-
 sylvania.
332 South Twenty-first street, Philadelphia, Penn.
- ***SMITH, SIDNEY I., Ph.D.** Biology.
 Professor of Comparative Anatomy, Yale University.
147 Whalley avenue, New Haven, Conn.
- STILES, CHARLES W., Ph.D.** Helminthology.
 Medical Zoölogist, Department of Agriculture, Washington,
 D.C.
Washington, D.C.
- TILTON, JOHN L., A.B.** Biology.
 Professor of Natural Science, Simpson Centenary College.
Indianola, Ia.
- ***TRUE, FREDERICK W., M.S.** Vertebrates.
 Curator of Mammals, U.S. National Museum.
National Museum, Washington, D.C.
- TUCKERMAN, FREDERICK, M.D., B.Sc.** Anatomy.
Amherst, Mass.
- TUTTLE, ALBERT H.** Biology.
 Professor of Biology, University of Virginia, Va.
Charlottesville, Va.
- ***TYLER, J. M., A.B.** Zoölogy.
 Professor of Zoölogy and Botany, Amherst College.
Amherst, Mass.

- ***VAN VLECK, B. H., S.B.** Biology.
Instructor in Biology and Physiology in Boston University.
Boston Society of Natural History, Boston, Mass.
- VERRILL, A. E., A.M.** Zoölogy.
Professor of Zoölogy, Yale University.
86 Whalley avenue, New Haven, Conn.
- ***WADSWORTH, M. E., A.M., Ph.D.** Mineralogy, Petrography, and Geology.
Director of the Michigan Mining School, and Professor of Mineralogy, Petrography, and Geology; also State Geologist of Michigan.
Michigan Mining School, Houghton, Mich.
- ***WALCOTT, C. D.** Palaeontology and Geology.
Palaeontologist, U.S. Geological Survey, and Hon. Curator of Invertebrate Palaeozoic Fossils, U.S. National Museum.
National Museum, Washington, D. C.
- WARD, HENRY A., A.M.** Natural Science.
Head of Ward's Natural Science Establishment.
16 to 26 College avenue, Rochester, N. Y.
- WARD, HENRY B., A.B.** Zoölogy.
Holder of a Morgan Fellowship, Harvard University.
12 Farwell place, Cambridge, Mass.
- ***WARREN, J. W., A.B., M.D.** Physiology.
Professor of Physiology, Bryn Mawr College.
Bryn Mawr, Penn.
- WATASE, S., B.S., Ph.D.** Biology.
Assistant and lecturer in Zoölogy, Clark University.
Clark University, Worcester, Mass.
- WHEELER, WILLIAM M.** Embryology.
Fellow in Morphology, Clark University.
Clark University, Worcester, Mass.
- WHITE, CHARLES D., B.S.** Palaeobotany and Geology.
Assistant Palaeontologist, U.S. Geological Survey.
U.S. National Museum, Washington, D. C.
- WHITFIELD, R. P., M.A.** Palaeontology.
(Late Professor at Troy, N.Y.) Curator of Geology and Conchology, American Museum of Natural History.
American Museum of Natural History, 77th street and 8th avenue, New York, N. Y.

- *WHITMAN, C. O., A.M., Ph.D. Animal Morphology.
 Editor, "Journal of Morphology;" Director of the Marine Biological Laboratory, Woods Hole, Mass.; Professor of Morphology, Clark University.
Worcester, Mass.
- *WILDER, BURT G., B.S., M.D. Vertebrate Morphology.
 Professor of Physiology, Comparative Anatomy, and Zoölogy, and Curator of Vertebrate Museum, Cornell University.
Cornell University, Ithaca, N.Y.
- *WILLIAMS, HENRY S., Ph.D. Geology and Palæontology.
 Professor of Geology and Palæontology, Cornell University, and Assistant Geologist, U.S. Geological Survey.
Cornell University, Ithaca, N.Y.
- *WILSON, EDMUND B., Ph.B., Ph.D. Animal Morphology.
 Adjunct Professor of Biology, Columbia College.
Columbia College, New York City.
- WILSON, HENRY V., A.B., Ph.D. Zoölogy.
 Professor of Biology, University of North Carolina.
Chapel Hill, N.C.
- WILSON, W. P., B.S., D.Sc. Botany.
 Professor of Physiological Botany, Department of Biology, University of Pennsylvania.
Philadelphia, Penn.
- WINCHELL, ALEXANDER, LL.D. Geology.
 Professor of Geology and Palæontology, University of Michigan.
Ann Arbor, Mich.
- WOLFF, JOHN E., A.B. Petrography.
 Instructor in Petrography, Harvard University.
15 Story street, Cambridge, Mass.
- WOODWORTH, WILLIAM M., A.B., A.M. Zoölogy.
 Assistant in Microscopical Anatomy, Harvard University.
149 Brattle street, Cambridge, Mass.
- *WRIGHT, R. RAMSAY, A.M., B.Sc. Zoölogy.
 Professor of Natural History, University College, Toronto, Canada.
University College, Toronto, Canada.

YOUNMANS, W. J., M.D.

Biology.

Editor of "Popular Science Monthly."

Office of "Popular Science Monthly," Bond street, New York, N.Y.

Number of honorary members	3
" " members	168
Total	171

TENTH MEETING, AT PHILADELPHIA.**DECEMBER 29, 1891.****HALL OF THE ACADEMY OF NATURAL SCIENCES.****AFTERNOON SESSION, 2.30 P.M.**

President Rice in the chair.

Twenty-five members present.

The Secretary reported the recommendations of the Executive Committee.

The following recommendation was read with the announcement that it would be brought up for discussion at the next session :—

“ The Executive Committee recommends to the Society the appropriation of \$100 for the ensuing year, towards the maintenance of an American table at the Naples Zoölogical Station.

“ Also, that the Society memorialize the Smithsonian Institution, recommending that the Institution assume the responsibility of maintaining an American table at the Naples Zoölogical Station in future years.”

The President appointed

G. MACLOSKIE,
E. D. COPE,
G. BAUR,

a committee to nominate officers for the ensuing year.

S. F. Clarke and W. N. Rice, in behalf of the Committee on Science Teaching in the Schools, reported as follows :—

**REPORT OF THE COMMITTEE ON SCIENCE
TEACHING IN THE SCHOOLS.**

The Committee are glad to be able to report progress in several directions.

At the meeting of the Ohio College Association, December, 1890, the following resolution was unanimously adopted :—

" This Association is of the opinion that the Natural Sciences should be taught demonstratively, as far as possible, in all grades of the Common Schools; and that, so soon as feasible, some branch of science should be included in the requirements for admission to College."

Since our last annual meeting, a circular letter has been sent out to the American Universities and Colleges, in number nearly four hundred. The circular reads as follows:—

" To the Faculty of

" In behalf of the American Society of Naturalists, we respectfully petition your honorable body to take into consideration the question of making such a change in your requirements for admission as to include therein some work in Natural or Physical Science.

" In presenting this petition, it is appropriate for us to give briefly the reasons which have led the Society to this action.

" The Society of Naturalists is a body of investigators and teachers of Natural Science. The majority of its members are professors of Biology or Geology in colleges or other higher institutions of the north-eastern United States. Its meetings have been mainly occupied with discussions as to the methods of carrying on the various branches of scientific work in which its members are engaged. The discussion of education in science has accordingly occupied much of its attention.

" In the consideration of scientific instruction in College, with a view to its improvement in method and result, the conclusion has forced itself upon our minds, that the main cause of the unsatisfactory results of scientific instruction in College is to be found in the lack of suitable elementary scientific training on the part of the students.

" While a liberal allowance of time is devoted to scientific studies in most of the College courses and in the English courses in Academies and High Schools, there is generally little or no time allotted to science in the Classical courses in Academies and High Schools, and in the schools of lower grade. Most of the students in the Colleges have therefore received no training or instruction in the sciences before reaching those studies in the College course. By so many years of exclusive attention to

other subjects, their powers of observation and of imagination of physical phenomena are well-nigh atrophied; and the loving interest in nature, innate in every normal child, instead of being systematically developed, is well-nigh extinguished.

"The remedy for this state of things is to be found in the introduction of elementary lessons in science at a much earlier period of the course. We believe that the study of nature should begin in the Primary School, and should continue, in increasingly systematic and philosophical methods, through all grades of the educational system. We believe that, in the light of sound principles of pedagogics, a system of education must be pronounced radically defective, which fails to gratify and to stimulate the curiosity of children in regard to the things about them and within them, confining them to more abstract studies, some of which are better suited to maturer minds.

"So far as the reform which we advocate relates to schools below the grade of the High School or Academy, we can ask from you only sympathy and moral support. But one most important step of progress is absolutely dependent upon the action of College Faculties and Corporations. The better class of High Schools and Academies are prepared to furnish instruction of very respectable quality in various departments of science; and actually do furnish such instruction to those of their students who are not preparing for College. They are ready to furnish such instruction to those students who are preparing for College, just as soon as it can find recognition in the Colleges as a part of the preparatory course.

"Hence we are led to make an earnest appeal to the Faculties of the Colleges to make some work in science form a part of the requirements for admission, being assured that in so doing they will be taking a most important step in the direction of a symmetrical and philosophical arrangement of the educational course.

"The question of the particular sciences which should be required for admission is a comparatively unimportant one. In the report adopted at the meeting of the Society in 1888 (a copy of which is forwarded herewith), the Committee recommended the selection of Phænogamic Botany, Human Physiology, and Physical Geography; the first, as furnishing most conveniently a thorough observational discipline; the second, as affording in-

formation of great utility; the third, as tending to keep alive a general sympathy with nature. It was, moreover, believed that the High Schools and Academies in general are prepared to teach these at least as well as any other science studies. There is, however, room for difference of opinion on the question whether other sciences, as Physics, Chemistry, and Zoölogy, may not have equal or even superior claims; and it is not unlikely that some preparatory schools are able to afford better instruction in some other sciences than in those recommended in the report. It would probably be best for the present, especially in view of the great inequality in the resources of different preparatory schools, to allow some degree of option to the candidate in regard to the particular science or sciences in which he should be examined. The point which we consider essential is that some study of nature should be required before admission to College.

"If it is deemed impracticable to make the proposed change in the requirements immediately, we would earnestly request that the principle be recognized by the insertion in the next Catalogue of a notice that some work in Natural Science will be required for admission after the year 1892 (or some other date that may seem convenient).

"We send you herewith the reports of the Committee on Science Teaching in the Schools, which have been unanimously adopted at the last two annual meetings of the Society, and an address of the President at the last annual meeting bearing upon the same subject. These documents will serve to set forth somewhat more fully the views of the Society, and will also give some history of the efforts which the Committee has made to call attention to these views, and of the favor with which they have been regarded by prominent Educational Associations.

"In addition to the endorsements of our views on the part of prominent Educational Associations, quoted in our second report, we would call attention to the following resolution, unanimously adopted by the Association of Officers of Colleges in New England, at its meeting in Middletown, Connecticut, Nov. 7, 1890.

"The Association of Officers of Colleges in New England desires to support the endeavor of the American Society of Naturalists to introduce instruction in Natural Science into

schools ; and the Association agrees with the Society in thinking it indispensable that the methods of instruction should invariably be demonstrative.'

- " SAMUEL F. CLARKE, Williams College.
- " WILLIAM G. FARLOW, Harvard University.
- " GEORGE L. GOODALE, Harvard University.
- " GEORGE MACLOSKIE, College of New Jersey.
- " WILLIAM NORTH RICE, Wesleyan University.
- " HENRY FAIRFIELD OSBORN, College of New Jersey.
- " WILLIAM T. SEDGWICK, Mass. Institute of Technology.
- " SIDNEY I. SMITH, Yale University.
- " C. O. WHITMAN, Clark University."

Answers to this circular were not solicited ; but information has come to us from several of the New England Colleges showing that the matter has received the serious consideration of the several Faculties. All of the Colleges from which we have heard are at least unwilling to say they will not make the change in a few years, and two of the Colleges have taken definite steps in this direction. They all believe that something ought to be done. One wishes to see what certain other Colleges will do ; another has made sufficient changes this year, but may be willing to move in this direction another year. A third has announced in its Catalogue that hereafter an examination in Natural Science will form one of the requisites for admission to the scientific course. At still another College, the offer is made in its Catalogue to receive men into advanced standing in Science who can pass special examinations requisite for those courses.

Prof. S. F. Clarke read a paper at the sixth annual meeting of the New England Association of Colleges and Preparatory Schools, entitled, "Natural Science as a Requisite for Admission to College." One of the facts stated in that paper is worth mentioning here. The writer was one of a committee of three which sent a circular letter to one hundred of the schools from which Williams College has received students in the last four years, asking them if they could prepare their students on the basis of a Natural Science requisite by 1893, or later. Of the ninety answers received, thirty-two are from Massachusetts, twenty-six are from New York, and the others are from all the other New England

States, New York, New Jersey, Pennsylvania, Ohio, Illinois, and Minnesota. It is a remarkable and significant fact that every school replied that they could so prepare their pupils. Again, of the ninety, nine answer, "yes," but object to the plan; the main objection being lack of time in the already busy course. Forty-five answer simply, "yes," and thirty-six add some word of decided approval.

In the discussion following this paper, President G. Stanley Hall offered the following suggestion:—"There is a great difference between subjects which have had for years the benefit of a good pedagogic manipulation and those which have not. Pedagogic thought has not been given to Science study. Text-books in Science have not had the benefit of pedagogic experience. Results might be attained if we were to appoint, for instance, a committee to arrange a conspectus of the work in Science."

Thereupon it was moved and voted by the New England Association of Colleges and Preparatory Schools:

"That the Executive Committee be instructed to consider the expediency of appointing a committee to formulate suggestions relating to Elementary Science as a requisite for admission to College, and have full authority to appoint such a committee if this action seems desirable."

The Executive Committee will meet next month, and the Secretary informs me that such a committee will probably be appointed.

At the recent meeting of the Association of Colleges in New England, it was voted to send the following circular letter to the Faculties of the Colleges included in its membership:—

"*To the Faculty of*

"At the 35th annual meeting of the Association of Colleges in New England, held at Brown University, Nov. 5-6, 1891, it was

"*Voted*, That the memorandum printed below be transmitted to the various Faculties for their consideration and for action by this Association next year; also *voted*, that the memorandum, with a statement of this reference of the same to the Faculties, be offered to the press for publication.

" MEMORANDUM.

"The Association of Colleges in New England, impressed with the real unity of interest and the need of mutual sympathy and help throughout the different grades of public education, invites the attention of the public to the following changes in the programme of New England Grammar Schools, which it recommends for gradual adoption : —

"1. The introduction of Elementary Natural History into the earlier years of the programme as a substantial subject, to be taught by demonstrations and practical exercises rather than from books.

"2. The introduction of Elementary Physics into the later years of the programme as a substantial subject, to be taught by the experimental or laboratory method, and to include exact weighing and measuring by the pupils themselves.

"3. The introduction of Elementary Algebra at an age not later than twelve years.

"4. The introduction of Elementary Plane Geometry at an age not later than thirteen years.

"5. The offering of opportunity to study French, or German, or Latin, or any two of these languages, from and after the age of ten years.

"In order to make room in the programme for these new subjects, the Association recommends that the time allotted to Arithmetic, Geography, and English Grammar be reduced to whatever extent may be necessary.

"The Association makes these recommendations in the interest of the public school system as a whole; but most of them are offered more particularly in the interest of those children whose education is not to be continued beyond the Grammar School.

"JOHN HOWARD APPLETON,
"Secretary."

An investigation has been made to ascertain the actual status of the Colleges and Preparatory Schools in the territory with which the Society of Naturalists is especially concerned (namely, the region of the North Atlantic States from Maine to the District of Columbia inclusive) as regards the inclusion of Science in the

Preparatory Course. Circulars were sent to all the Institutions within that area catalogued, in the latest Report of the Commissioner of Education, as Colleges or Scientific Schools, and also to the Academies and High Schools catalogued in the same Report as having respectively six or more teachers, asking for catalogues or statements of courses of study. The Institutions catalogued as Colleges or as Scientific Schools vary considerably in grade; but it was deemed best to follow the classification given in the report of the Commissioner of Education, rather than to exercise a personal judgment in the case of individual Institutions. The limitation of the inquiry, in regard to Academies and High Schools, to those having a Faculty of not less than six instructors, was intended as a rough way of eliminating very small and unimportant schools. A number of the High Schools and Academies from which information was received, proved to be not Preparatory Schools for College at all, and are accordingly not counted in the following statistics. The answers received from a few schools were so vague as not to admit of tabulation. Institutions having a course of study of more than four years, of which the last four years correspond approximately to the Collegiate Course, and the previous year or years to the closing part of the Preparatory Course, are counted in the following statistics both as Colleges and as Preparatory Schools.

Of sixty-nine Colleges from which answers have been received, only eighteen now require Science for admission to the Course for the Degree of Bachelor of Arts. These are Howard University, Baltimore City College, Johns Hopkins University, Western Maryland College, Boston University, Harvard University, Alfred University, Wells College, Polytechnic Institute of Brooklyn, College of the City of New York, Manhattan College, Syracuse University, Lebanon Valley College, Geneva College, Monongahela College, Franklin and Marshall College, Allegheny College, Swarthmore College.

Eleven other Colleges recognize the place of Science in the pre-collegiate portion of the educational course, by requiring it for admission to Scientific Courses, by allowing it as an optional subject in the examination for admission, or by announcing it as a prospective requirement. These are Wesleyan University, Smith College, Williams College, Dartmouth College, Colgate Univer-

sity, Lafayette College, Ursinus College, Pennsylvania College, Haverford College, Westminster College, University of Pennsylvania.

The remaining forty Colleges afford no recognition whatever of the place of Science in the pre-collegiate course of study.

Of twenty-one Institutions catalogued as Scientific Schools from which answers have been received, ten do, and eleven do not, require some Science for admission.

Of one hundred and forty-one Preparatory Schools from which answers have been received, ninety-eight include Science, either as a required or as an elective study, in the course preparatory for the Classical Courses in the Colleges. This fact seems to indicate that the Academies and High Schools are in advance of the Colleges in the recognition of the claims of Science to a place in the pre-collegiate part of the educational course. There is no doubt that nearly all Preparatory Schools of high grade would be ready to give liberal attention to scientific instruction, if their scholars could receive credit for it as meeting thereby a requirement for admission to the Colleges.

One of the most frequent objections urged against the requirement of Science for admission to College is the alleged impossibility of finding time for the study in the four years' course of the Preparatory Schools. We believe that this objection is sufficiently refuted by the information which we have gathered in regard to the actual courses of study in the Preparatory Schools. The requirements for admission to the Classical Course in most of the Colleges consist substantially of Latin, Greek, and Mathematics, with a little History and English Literature. In order to meet these requirements, the student is ordinarily expected to spend four years in a High School or Academy after the completion of the courses in the Primary and Grammar Schools. A length of four years for the preparatory course is necessitated by the amount of Latin required, which, with the methods of study at present in use, is amply sufficient to occupy the time of a recitation five times a week for four years. The work in Greek and in Mathematics, however, is much less than four years' work; and the slight requirements in History and English Literature do not suffice to bring the work up to the standard of about sixteen recitations per week for the four years. There remains,

therefore, in a four years' course in an Academy or High School, some time which may be, and which actually is, occupied by other studies than those required for admission to College. Many Schools actually do include Science or Modern Languages in their Classical Courses, although these studies are not now required for admission to most of the Colleges. Many Schools include more extended studies in English Literature than are required for admission to College, or other advanced studies entirely outside of the College requirements. A large number of Schools occupy a considerable part of the first year with studies in the common English branches, which should be completed in the Grammar Schools. And a considerable number of the Schools devote the greater part or the whole of the last term to reviews of the studies of previous years—a time-wasting plan, whose justification, if it ever had any, has been largely removed, since many of the Colleges now accept certificates from first-class Preparatory Schools in lieu of examination, and since nearly all the Colleges allow preliminary examinations on the earlier portions of the Preparatory Course.

Among the Preparatory Schools from which sufficiently definite information has been received, there are seventy-four which appear to have substantially the normal four years' Preparatory Course. In selecting this number of schools for further consideration, we have rejected all those in which the time devoted to the Course preparatory for College (as indicated by the period of commencing Latin) is either more or less than four years; and have rejected also those few schools whose Preparatory Course is largely elective, in adaptation to the peculiar requirements of Harvard University. Of the remaining seventy-four schools from which information, forty-seven include in their courses more or less Science, thirty-two include one or both of the Modern Languages, fifty include miscellaneous advanced studies not required for admission to College, fifty-five occupy a considerable time with common English branches, and fifty occupy a considerable portion of the last year with reviews of the previous years. It is a very noteworthy fact that, of the whole number, there is not one which does not fill out its course in one or more of the five ways specified. These facts, we claim, conclusively prove that the studies now required for admission to College do

not occupy the whole time of a four years' course subsequent to the completion of the Grammar School course. There is, therefore, ample time in the High School or Academy Course to meet a moderate requirement in Natural Science for admission to College.

The facts which have come to the knowledge of the Committee, and some of which are presented in this report, indicate clearly that there exists, among all ranks of educators, a conviction continually widening and continually growing more active, that a prominent place should be given to Natural Science in the earlier portions of the educational course. We believe, however, that there is danger that in many quarters this movement may fail of the good results which it should accomplish, by reason of a misapprehension in regard to the true purpose and method of scientific instruction. There is danger of getting, in many schools, the form of science teaching without the substance,—a memorizing of definitions and verbal statements of scientific facts, without bringing the minds of the pupils into inspiring and vitalizing contact with nature. However important the knowledge of scientific facts may be as matter of information, it should never be forgotten that the main benefit of scientific study lies in the discipline of the powers of perception, imagination, comparison, and reasoning, by the practice of observation and experiment upon natural objects, and by judiciously guided reflection upon the phenomena which are brought before the student's attention. Especially pernicious will it be, if the learning of verbal propositions is allowed to take the place of those object lessons in Science which should form the main part of the scientific instruction in the Primary Schools. In the lower grades of the schools, systematized bodies of fact and doctrine are altogether out of place. While the scientific instruction in the High Schools and Academies may be and should be more systematic than in the lower schools, it should be continually remembered that the discipline gained by actual contact with nature in observation and experiment is worth far more than any amount of second-hand information.

The greatest difficulty in the way of securing the right kind of instruction arises, of course, from the lack of properly trained teachers. It is, however, a profoundly gratifying fact that this

lack is gradually but surely being supplied. Within the last twenty years, a great change has taken place in the boards of instruction in High Schools and Academies. Twenty years ago the faculty of an average High School in a second-class town consisted of one College graduate, who taught Latin and Greek, and a number of young ladies, graduates only of the High School itself, who taught all the other branches. Now, thanks to the work of the women's Colleges and the co-educational Colleges, the teachers in the High Schools and Academies are coming to be almost exclusively College graduates. High School teachers who have had Laboratory training themselves in some of the Sciences, will not be content to teach those Sciences without giving some Laboratory work to their pupils. Hence it is gradually coming to pass that the graduates of High Schools, Academies, and Normal Schools, from whose ranks the teachers of the Primary and Grammar Schools are chiefly supplied, possess an acquaintance with Science which, though limited in scope, is in considerable part sound in method. The Summer Schools and Sea-side Laboratories afford the opportunity for scientific instruction of the right sort to those ambitious teachers whose opportunities of early education are recognized by themselves as inadequate. Let it be clearly recognized that the teacher of Science demanded even in the Primary Schools is not one who has committed to memory some verbal propositions about Science, but one who has learned to observe and experiment, to compare and reason, — and the conditions are already in existence which will not fail to supply that demand.

The work of the Committee during the year has involved some expense in printing, postage, etc., which expense the Committee ask the Society to assume.

We also ask to have authorized the publication of a special edition of five hundred copies of this report for distribution in educational circles.

The above is respectfully submitted.

SAMUEL F. CLARKE,
Chairman.

The report was accepted, with expressions of appreciation on the part of the Society for the work done by the Committee, and the Committee was continued.

The following invitation, extended to the members of the Society, was then read :—

“ Dr. E. J. James, President of the American Society for the extension of University Teaching, invites the members of this Society to the President’s reception, given in connection with the first Annual National Conference on the extension of University Teaching.”

The morning session for Wednesday was fixed for 10 A.M., and the afternoon session for 2.30 P.M.

The President’s address,

“ Twenty-five Years of Scientific Progress,” was read by Prof. Wm. North Rice, the retiring president.

The following papers were then read :—

MISS EMILY L. GREGORY, on “The two Schools of Plant Physiology as at present existing in Germany and England.”

PROFESSOR MACLOSKIE, on “The Structure of Insect Tracheæ.”

PROFESSOR MACLOSKIE (for Mr. McClure, of Princeton), “Observations on the Poison Apparatus of Young Rattlesnakes.”

PROFESSOR PILLSBURY, “A Device for Attaching Labels to Specimen Bottles.”

PROF. H. F. OSBORN, “Nomenclature of the Mammalian Molar Cusps.”

The meeting then adjourned.

DECEMBER 30, 1891.

MORNING SESSION, 10 A.M.

President Rice in the chair.

Thirty members present.

In the absence of Prof. Wm. T. Sedgwick, the Treasurer’s report was read by the Secretary.

The Treasurer of the American Society of Naturalists respectfully submits the following

REPORT:

Balance on hand, Dec. 30, 1890	\$689 77
Income, from dues, 1891	134 00
 Total	\$823 77
Out-go for 1891, as shown below	108 22
 Balance on hand, Dec. 29, 1891	\$715 55

EXPENSE ACCOUNT, 1891.

H. H. Donaldson, Secretary, expenses, Boston meeting	\$24 43
S. F. Clarke, expenses of Committee on Elementary Science Teaching in the schools	30 21
Rockwell & Churchill, printing Records, Vol. I., pt. 8	49 09
Postage	4 50
 Total expenses	\$108 22
Total income	134 00
 Excess of income for 1891	\$25 78

On Dec. 27, 1888, it was voted by the Society to reduce the annual fee from \$2 to \$1. The balance then on hand was \$764.81. In spite of this reduction of the annual income, however, the amount now on hand (\$715.55) is nearly equal to that on hand three years ago. The explanation is to be found in a marked decrease in the annual expenses, especially in the publishing account.

Respectfully submitted,

Wm. T. SEDGWICK,

Treasurer.

DEC. 30, 1891.

The President appointed

W. H. DALL,
J. H. PILLSBURY,

a Committee to audit the report.

They found the same correct, and it was accepted by the Society.

J. H. Pillsbury was appointed Deputy Treasurer to collect the dues during the meeting.

As recommended by the Executive Committee at the previous session, the following persons were elected members of the Society : —

J. A. ALLEN,	C. F. W. McCCLURE,
R. P. BIGELOW,	G. V. McLAUTHLIN,
H. T. FERNALD,	A. H. PHILLIPS,
G. W. FULLER,	W. A. SETCHELL,
C. W. HARGITT,	C. W. STILES,
J. E. IVES,	H. B. WARD.

The recommendation of the Executive Committee concerning a table at the Naples station was taken up, and, after discussion by Professor Osborn and Dr. Stiles, it was adopted in the form above given.

The Nominating Committee reported the following list of persons to act as officers to act during the coming year : —

REPORT OF COMMITTEE ON NOMINATIONS.

We recommend for

President, — H. FAIRFIELD OSBORN.

Vice-Presidents, — SAMUEL F. CLARKE,

GEORGE BAUR,

WM. H. DALL.

Secretary, — THOS. H. MORGAN.

Treasurer, — WILLIAM T. SEDGWICK.

For Executive Committee elected from the Society at large, —

J. PLAYFAIR McMURRICH,

W. P. WILSON.

The report was accepted, and the persons named in it duly elected.

The Society proceeded next to consider the topic chosen for discussion, viz. :

DEFINITE *versus* FORTUITOUS VARIATION.

By previous arrangement the discussion was opened in the following manner :—

- (1.) Mr. Thomas Meehan presented the evidence derived from the study of plants.
- (2.) Prof. J. P. McMurrich presented that derived from the study of invertebrates.
- (3.) Dr. J. A. Allen presented that derived from the study of recent vertebrates.
- (4.) Prof. E. D. Cope presented that derived from the study of fossil forms.

When the question was thrown open, some fifteen members availed themselves of the opportunity to speak on the topic, and the discussion continued until 1.30 P.M., when the Society adjourned for lunch.

AFTERNOON SESSION, 3 P.M.

President Rice in the chair.

Twenty members present.

The following motion was introduced by Professor Macloskie :—

Resolved, That the thanks of the Society be tendered to

1. The Philadelphia Academy of Natural Sciences, for the generous use of their hall.
2. To the officers and members of the Art Club for their hospitable invitation.
3. To the authorities of Bryn Mawr College, of Haverford College, of Swarthmore College, of the University of Pennsylvania, and to the Committee of Reception in connection with the American Association for the Extension of University Teaching, for their kind invitation to their reception proffered to the members of this Society.

This motion was unanimously adopted.

It was voted to leave the determination of the time and place of the next meeting with the Executive Committee.

The following reports on Scientific Expeditions were then made :—

DR. G. BAUR: On the Examination of the Flora and Fauna of the Galapagos Islands.

PROF. A. HEILPRIN: A Description of the West Coast of Greenland, from Observations made during the Summer of 1891.

PROF. S. A. LEE: A Summary of the Scientific Results of the Bowdoin College Exploring Expedition, sent to the East Coast of Labrador in the Summer of 1891.

PROF. W. LIBBEY: Some Results of the Study of Warm and Cold Ocean Currents off the Southern New England Coast in the neighborhood of the Gulf Stream.

The Society then adjourned, to meet later in the evening at the Colonnade Hotel for the annual dinner.

HENRY H. DONALDSON,
Secretary.

P

P



RECORDS
OF THE
AMERICAN SOCIETY
OF
NATURALISTS.

VOLUME I.

PART TEN.

BOSTON:
PUBLISHED BY THE SECRETARY.
1893.

R E C O R D S .

LIST OF OFFICERS FOR 1893.

President, R. H. CHITTENDEN.

Vice-Presidents, { SAMUEL F. CLARKE,
GEORGE BAUR,
WILLIAM LIBBEY, Jr.

Secretary, THOMAS H. MORGAN.

Treasurer, WILLIAM T. SEDGWICK.

*Members of the Executive Committee elected from the
Society at large.*

W. G. FARLOW.

JOHN A. RYDER.

LIST OF HONORARY MEMBERS.

***DANA, JAMES D.**, Ph.D., LL.D., Mineralogy, Zoölogy, Geology.
 Professor of Geology, Yale University.
Yale University, New Haven, Conn.

LESLEY, J. P., A.M., LL.D. Geology.
 State Geologist of Pennsylvania.
907 Walnut street, Philadelphia, Penn.

MARSH, O. C., Ph.D., LL.D. Palæontology.
 Professor of Palæontology, Yale University.
8 Peabody Museum, New Haven, Conn.

LIST OF MEMBERS.

[An asterisk designates original membership.]

- ***ALLEN, HARRISON, M.D.** Comparative Anatomy.
1933 Chestnut street, Philadelphia, Penn.
- ALLEN, J. A., Ph.D.** Mammalogy and Ornithology.
Curator of the Department of Vertebrate Zoölogy, Ameri-
can Museum of Natural History, New York.
American Museum of Natural History.
77th street and 8th avenue, New York, N.Y.
- ALLIS, EDWARD P., Jr.** Biology.
Associate Editor of the "Journal of Morphology."
Milwaukee, Wis.
- ANDREWS, E. A., Ph.D.** Biology.
Associate Professor in Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- AYERS, HOWARD, Ph.D.** Biology.
Director Lake Laboratory, Milwaukee, Wis.
- BAMHART, JOHN H., A.B.** Biology.
Curator in charge of Museum of Wesleyan University.
Middletown, Conn.
- BARTON, B. W., M.D.** Botany.
Instructor in Botany, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- BAUR, GEORGE, Ph.D.** Vertebrate Palæontology.
Assistant Professor of Comparative Osteology and Palæon-
tology, University of Chicago.
University of Chicago, Chicago, Ill.
- ***BICKMORE, ALBERT S.**
Secretary and Professor in charge of Department of Public
Instruction of the American Museum of Natural History.
American Museum, Central Park, N.Y.

- BIGELOW, R. P., Ph.D. Animal Morphology.
 Bruce Fellow, Johns Hopkins University.
1501 Eighteenth street, Washington, D.C.
- BOLTON, H. CARRINGTON, A.M., Ph.D. Mineralogy, Chemistry.
University Club, New York City.
- *BOWDITCH, HENRY P., A.M., M.D. Physiology.
 Professor of Physiology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- BRANNER, JOHN CASPER, A.M., Ph.D. Geology.
 Professor of Geology, Leland Stanford, Junior, University.
Palo Alto, Cal.
- BREWER, WILLIAM H., Ph.D. Biology.
 Professor of Agriculture, Yale University.
246 Orange street, New Haven, Conn.
- *BRUSH, G. J. Mineralogy.
 Director, Sheffield Scientific School.
New Haven, Conn.
- BUMPUS, H. C., Ph.D. Comparative Anatomy.
 Associate Professor of Zoölogy, Brown University.
Brown University, Providence, R.I.
- CALKINS, G. N., B.S. Biology.
 Assistant Biologist, State Board of Health of Massachusetts.
Institute of Technology, Boston, Mass.
- CAMPBELL, JOHN P., Ph.D. Physiology.
 Professor of Biology, University of Georgia, Athens, Ga.
- CASEY, THOMAS L. Entomology.
 Captain, U.S. Engineer Corps.
U.S. Army Building, New York, N.Y.
- CHAPMAN, FRANK M. Mammalogy and Ornithology.
 Assistant Curator, American Museum of Natural History.
77th street and 8th avenue, New York, N.Y.
- CHITTENDEN, R. H., Ph.D. Physiology.
 Professor of Physiological Chemistry, Yale University.
83 Trumbull street, New Haven, Conn.
- CLARK, WILLIAM B., Ph.D. Palæontology.
 Associate in Palæontology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- *CLARKE, SAMUEL F., Ph.B., Ph.D. Zoölogy.
 Professor of Natural History, Williams College.
Williamstown, Mass.

*CONN, H. W., Ph.D.

Assistant Professor of Biology, Wesleyan University.
Middletown, Conn.

*COPE, EDWARD D. Vertebrate Palæontology and Zoölogy.
Professor of Vertebrate Palæontology, University of Pennsylvania.

2102 Pine street, Philadelphia, Penn.

*COUES, ELLIOTT, A.M., M.D., Ph.D. Vertebrates, Bibliography.

Smithsonian Institution, Washington, D.C.

DALL, WILLIAM HEALEY. Mollusca, Palæontology.
Palæontologist, U.S. Geological Survey, Honorary Curator,
Department of Mollusks, U.S. National Museum.

Smithsonian Institution, Washington, D.C.

DANA, EDWARD S., Ph.D.

Assistant Professor of Natural Philosophy, Yale University.
111 Grove street, New Haven, Conn.

DAVENPORT, CHARLES B., A.B., A.M. Zoölogy.
Instructor in Zoölogy, Harvard University.

Cambridge, Mass.

*DAVIS, WILLIAM M., S.B., M.E. Geology, Geography, and
Meteorology.

Assistant Professor of Physical Geography, Harvard University.

Museum of Comparative Zoölogy, Cambridge, Mass.

DEAN, BASHFORD, Ph.D. Vertebrate Zoölogy.
Assistant in Biology.

Columbia College, New York, N.Y.

*DIMMOCK, GEORGE, Ph.D. Zoölogy.
Canobie Lake, N.H.

DOLLEY, CHARLES S. Biology.
Professor of Natural History in Swarthmore College.

Woodland avenue, Philadelphia, Penn.

*DONALDSON, HENRY H., Ph.D. Physiology.
Professor of Neurology, University of Chicago.

Chicago, Ill.

*DUDLEY, WILLIAM R., M.S. Cryptogamic Botany.
Assistant Professor of Cryptogamic Botany, Leland Stanford, Junior, University.

Palo Alto, Cal.

- *DUTTON, C. E. Geology.
Major of Ordnance, U.S.A.
U.S. Geological Survey, Washington, D.C.
- DWIGHT, THOMAS, A.M., M.D. Anatomy.
Parkman Professor of Anatomy, Harvard Medical School.
235 Beacon street, Boston, Mass.
- *DWIGHT, WILLIAM B., A.B., A.M., Ph.B. Palæontology.
Professor of Natural History and Curator of the Museum,
Vassar College.
Vassar College, Poughkeepsie, N.Y.
- EDWARDS, CHAS. L., A.M., Ph.D. Zoölogy.
Professor of Zoölogy, University of Texas.
Austin, Texas.
- ELLIOT, D. G. Mammalogy and Ornithology.
American Museum Natural History, New York, N.Y.
- *EMERSON, B. K., Ph.D. Geology and Mineralogy.
Professor of Geology, Amherst College.
Amherst, Mass.
- *EMERTON, JAMES H. Zoölogy.
11 St. James avenue, Boston, Mass.
- *EMMONS, S. F. Geology.
Geologist of the U.S. Geological Survey.
U.S. Geological Survey, Washington, D.C.
- ERNST, HAROLD C., A.M., M.D. Bacteriology.
Assistant Professor of Bacteriology, Harvard Medical
School.
Harvard Medical School, Boston, Mass.
- *FARLOW, WM. G., A.B., M.D. Botany.
Professor of Cryptogamic Botany, Harvard University.
Harvard University, Cambridge, Mass.
- *FERNALD, C. H., A.M.; Ph.D. Microlepidoptera.
Professor of Zoölogy, Massachusetts Agricultural College.
Amherst, Mass.
- FERNALD, HENRY T., M.S., Ph.D. Morphology.
Professor of Zoölogy, Pennsylvania State College.
State College, Centre Co., Penn.
- FEWKES, J. WALTER. Ethnology.
Secretary, Boston Society of Natural History.
Boston, Mass.

- FOX, L. WEBSTER, M.D.** Anatomy and Physiology.
 Clinical Assistant, Jefferson Medical College Hospital,
 Ophthalmic Surgeon to Germantown Hospital.
1304 Walnut street, Philadelphia, Penn.
- FULLER, GEORGE W., S.B.** Bacteriology.
 Chief Assistant-Biologist, State Board of Health of Massachusetts.
Lawrence, Mass.
- *GAGE, SIMON H., S.B.** Vertebrate Morphology and Physiology.
 Associate Professor of Physiology and Lecturer on Microscopical Technology, Cornell University.
Cornell University, Ithaca, N.Y.
- GANONG, WM. FRANCIS.** Biology.
119 Oxford street, Cambridge, Mass.
- GARDINER, EDWARD G., S.B., Ph.D.** Zoölogy.
131 Mt. Vernon street, Boston, Mass.
- GARDINER, FREDERIC, A.B.** Biology.
 Instructor in Natural Science, Trinity College.
Pomfret, Conn.
- *GERRISH, FREDERIC HENRY, A.M., M.D.** Anatomy.
 Professor of Anatomy, Bowdoin College.
675 Congress street, Portland, Me.
- *GILBERT, G. K.** Geology.
 Geologist of the U.S. Geological Survey.
U.S. Geological Survey, Washington, D.C.
- *GOODALE, GEORGE L., A.M., M.D.** Botany.
 Professor of Botany, Harvard University.
10 Craigie street, Cambridge, Mass.
- *GOODE, G. BROWN, A.M., Ph.D.** Zoölogy.
 Assistant Secretary of the Smithsonian Institution in charge
 of the U.S. National Museum.
Smithsonian Institution, Washington, D.C.
- GRATACAP, L. P., M.A., Ph.B.** Mineralogy and Geology.
 Assistant Curator of Geology, American Museum of Natural
 History, New York.
77th street and 8th avenue, New York, N.Y.
- *GREENLEAF, R.W., A.M., M.D.** Botany.
561 Boylston street, Boston, Mass.
- GREGORY, EMILY L., Ph.D.** Botany.
343 Madison avenue, New York, N.Y.

- HAGUE, ARNOLD.** Geology and Petrography.
Geologist, U.S. Geological Survey.
U.S. Geological Survey, Washington, D.C.
- ***HALL, JAMES M. S., A.M., M.D., LL.D.** Geology, Palæontology.
State Geologist of New York, Director of the State Museum
of Natural History.
State Museum, Albany, N.Y.
- HALSTED, BYRON D., D.Sc.** Botany.
Botanist and Horticulturist, Agricultural Experiment Station.
New Brunswick, N.J.
- HARE, HOBART AMORY, B.Sc., M.D.** Physiology.
Professor of Therapeutics in Jefferson Medical College of
Philadelphia.
222 South Fifteenth street, Philadelphia, Penn.
- HARGITT, CHARLES W., Ph.D.** Zoölogy.
Professor of Biology, Syracuse University.
Syracuse University, Syracuse, N.Y.
- ***HEILPRIN, ANGELO.** Palæontology and Geology.
Professor of Invertebrate Palæontology at, and Curator in
Charge of, the Academy of Natural Sciences of Phila-
delphia, and Professor of Geology at the Wagner Free
Institute of Science.
Academy of Natural Sciences, Philadelphia, Penn.
- ***HENSHAW, SAMUEL.** Zoölogy.
Assistant, Boston Society of Natural History.
Boston Society of Natural History, Boston, Mass.
- HERRICK, F. H., A.B., Ph.D.** Biology.
Professor of Biology, Adelbert College.
Adelbert College, Cleveland, O.
- HILL, FRANK A.** Geology.
Geologist in Charge, Anthracite District, State Survey of
Pennsylvania.
Dunbar, Fayette Co., Penn.
- ***HITCHCOCK, C. H., Ph.D.** Geology.
Professor of Geology and Mineralogy, Dartmouth College.
Hanover, N.H.
- HODGE, CLIFTON F., A.B., Ph.D.** Physiology.
Clark University.
Worcester, Mass.

- HOWELL, WILLIAM H., A.B., Ph.D. Physiology.
Assistant Professor of Physiology, Harvard Medical School.
Boston, Mass.
- *HYATT, ALPHEUS, S.B. Palæontology and Zoölogy.
Curator of the Boston Society of Natural History, and Assistant
in Museum of Comparative Zoölogy, at Cambridge, Mass.
Boston Society of Natural History, Boston, Mass.
- IDDINGS, JOSEPH P., Ph.B. Geology and Petrography.
Geologist, U.S. Geological Survey.
Washington, D.C.
- IVES, J. E. Invertebrate Zoölogy.
Assistant to the Curator in Charge of the Academy of Nat-
ural Sciences of Philadelphia.
Academy of Natural Sciences, Philadelphia, Pa.
- JACKSON, ROBERT TRACY, S.B., S.D. Zoölogy and Palæon-
tology.
33 Gloucester street, *Boston, Mass.*
- JAYNE, HORACE, M.D. Vertebrata.
Professor of Vertebrate Morphology, University of Penn-
sylvania.
1826 Chestnut street, *Philadelphia, Penn.*
- JOHNSON, HERBERT P., A.M. Biology.
Fellow in Morphology, Clark University.
Worcester, Mass.
- JORDAN, DAVID STARR. Biology.
President of Leland Stanford, Juuior, University, Palo Alto,
Cal.
Palo Alto, Cal.
- JORDAN, EDWIN O., S.B. Biology.
Tutor in Anatomy, University of Chicago.
Chicago, Ill.
- *JULIEN, ALEXIS A., Ph.D. Biology and Petrography.
Instructor in Biology and Microscopy, School of Mines,
Columbia College.
School of Mines, Columbia College, New York, N.Y.
- KELLAR, IDA A., Ph.D. Botany.
Lecturer, Bryn Mawr College.
Academy of Natural Science, Philadelphia, Penn.
- KNOWLTON, Frank H., M.S. Geology.
U.S. Geological Survey, *Washington, D.C.*

- LANE, ALFRED CHURCH, A.M., Ph.D.** Petrography and Geology.
 Instructor in Petrography and Geology, Michigan Mining School, and Assistant on Michigan Geological Survey.
Houghton, Mich.
- LEE, F. S., A.M., Ph.D.** Physiology.
 Demonstrator of Physiology, Columbia College, Medical Department.
College of Physicians and Surgeons, New York City.
- ***LEE, LESLIE A., Ph.D.** Geology and Biology.
 Professor of Geology and Biology, Bowdoin College.
Brunswick, Me.
- LEE, THOMAS G., M.D.** Morphology.
 Professor of Biology, University of Minnesota.
Minneapolis, Minn.
- ***LIRBEY, WILLIAM, Jr., A.M., D.Sc.** Histology.
 Professor of Physical Geography, Princeton College, and Director of the E. M. Museum of Geology and Archæology.
Princeton, N.J.
- LINTON, EDWIN, Ph.D.** Zoölogy.
 Professor of Geology and Biology, Washington and Jefferson College.
Washington, Penn.
- LOTSY, T. P., Ph.D.** Botany.
 Fellow, Johns Hopkins University.
Baltimore, Md.
- LUCAS, FREDERIC A.** Avian Osteology.
 Assistant Curator, Department of Comparative Anatomy, U.S. National Museum.
Washington, D.C.
- ***MACCOSKIE, GEORGE, D.Sc., LL.D.** Biology.
 Professor of Biology, Princeton College.
Princeton, N.J.
- MALL, F. P., M.D.** Histology and Vertebrate Embryology.
 Associate Professor of Anatomy, University of Chicago.
Chicago, Ill.
- MARK, EDWARD L., A.M., Ph.D.** Zoölogy.
 Hersey Professor of Anatomy, Harvard University.
21 North avenue, Cambridge, Mass.

- *MARSHALL, JOHN P., A.M. Mineralogy and Geology.
Professor of Mineralogy and Geology, Tufts College.
College Hill, Mass.
- *MARTIN, H. NEWELL, A.M., M.D., D.Sc., F.R.S. Physiology.
Professor of Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- McCLURE, CHARLES F. W., A.B. Embryology and Vertebrate
Morphology.
Instructor in Biology at Princeton College.
Princeton, N.J.
- *McGEE, W. J. Geology.
Geologist, U.S. Geological Survey.
U.S. Geological Survey, Washington, D.C.
- McMURRICH, J. PLAYFAIR, A.M., Ph.D. Animal Morphology.
Professor of Biology, University of Cincinnati.
Cincinnati, Ohio.
- *MEEHAN, THOMAS. Botany.
Botanist to the Pennsylvania State Board of Agriculture;
Vice-President, Academy of Natural Sciences, Philadelphia.
Germantown, Penn.
- *MERRIAM, C. HART, M.D. Mammals and Birds.
Chief of Division of Economic Ornithology and Mammalogy
of the U.S. Department of Agriculture, and Secretary of
the American Ornithologists' Union.
Washington, D.C.
- *MERRILL, F. J. H., Ph.D. Geology.
Assistant State Geologist, State Museum.
Albany, N.Y.
- *MERRILL, GEORGE P., M.S. Lithology.
Curator, Department of Geology, U.S. National Museum.
National Museum, Washington, D.C.
- MILLS, T. WESLEY, M.D. Biology.
Professor of Physiology, McGill University.
Montreal, Canada.
- *MINOT, CHARLES SEDGWICK, S.B., S.D. Biology.
Assistant Professor of Embryology and Histology, Harvard
Medical School.
Harvard Medical School, Boston, Mass.

- MIXTER, SAMUEL J., B.S., M.D. Anatomy.
 Demonstrator of Anatomy, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- MORGAN, THOS. HUNT, B.S., Ph.D. Biology.
 Associate Professor of Biology, Bryn Mawr College.
Bryn Mawr, Penn.
- *MORSE, EDWARD S., Ph.D. Anthropology and Zoölogy.
 Director of the Peabody Academy of Science, Salem, Mass.
Salem, Mass.
- NICHOLS, HERBERT, Ph.D. Psychology.
 Instructor in Psychology, Harvard University.
12 Kirkland place, Cambridge, Mass.
- *NILES, WILLIAM H., Ph.B., A.M. Physical Geography and
 Historical Geology.
 Professor of Geology and Geography, Massachusetts Institute of Technology.
Massachusetts Institute of Technology, Boston, Mass.
- OLIVER, CHARLES A., A.M., M.D. Special Sense Morphology and Physiology.
 Surgeon to Wills Eye Hospital and Ophthalmic Surgeon to the Presbyterian Hospital.
1507 Locust street, Philadelphia, Penn.
- *OSBORN, HENRY FAIRFIELD, Sc.D. Vertebrate Morphology.
 Da Costa Professor of Biology, Columbia College, Curator of Department of Mammalian Palaeontology, American Museum of Natural History, N.Y.
American Museum of Natural History, New York City.
- *PACKARD, A. S., A.M., M.D., Ph.D. Zoölogy.
 Professor of Zoölogy and Geology, Brown University.
Brown University, Providence, R.I.
- PARKER, GEORGE HOWARD, S.B. Animal Morphology.
 Instructor in Zoölogy, Harvard College.
8 Harris street, North Cambridge, Mass.
- *PEALE, A. C., A.M., M.D. Geology.
 Geologist, U.S. Geological Survey.
Geological Survey, Washington, D.C.
- PECK, JAMES I., A.M. Zoölogy.
 Assistant in Biology, Williams College.
Williamstown, Mass.

- *PECKHAM, GEORGE W., M.D. Biology.
 Teacher of Biology, Milwaukee High School.
Milwaukee, Wis.

PENFIELD, SAMUEL L., Ph.B. Mineralogy.
 Assistant Professor of Mineralogy, Yale University.
Peabody Museum, New Haven, Conn.

PHILLIPS, ALEXANDER H., S.B. Vertebrate Anatomy.
 Instructor in Biology at Princeton College.
Princeton, N.J.

*PILLSBURY, J. H. Biology.
50 Mattoon street, Springfield, Mass.

*POWELL, J. W., Ph.D., LL.D. Anthropology and Geology.
 Director of the U.S. Geological Survey, and Director of the
 Bureau of Ethnology, Smithsonian Institution.
Geological Survey, Washington, D.C.

PRATT, HENRY S., Ph.D. Zoölogy.
26 Mellen street, Cambridge, Mass.

*PRENTISS, A. N., S.M. Botany.
 Professor of Botany, Horticulture, and Arboriculture, Cor-
 nell University.
Cornell University, Ithaca, N.Y.

PROSSER, CHARLES S., S.M. Geology and Palæontology.
 Professor of Geology, Washburn College.
Topeka, Kan.

*PUTNAM, FREDERICK W. Archæology and Ethnology.
 Peabody Professor of American Archæology and Ethnology,
 Harvard University; Curator of the Peabody Museum of
 Archæology and Ethnology, in connection with Harvard
 University; Permanent Secretary of the American Associa-
 tion for the Advancement of Science; Massachusetts
 State Commissioner on Inland Fisheries; and President,
 Boston Society of Natural History.
Peabody Museum, Cambridge, Mass.

RANKIN, WALTER M., A.M., M.Sc., Ph.D. Biology.
 Instructor in Biology and Curator of Museum, Princeton
 College.
60 University place, Princeton, N.J.

*RATHBUN, RICHARD, S.M. Invertebrates.
 Curator, Dep't of Marine Invertebrates, National Museum.
U.S. National Museum, Washington, D.C.

- REICHART, EDWARD T., M.D.** Physiology.
 Professor of Physiology, University of Pennsylvania.
University of Pennsylvania, Philadelphia, Penn.
- REIGHARD, JACOB E.** Morphology.
 Professor of Animal Morphology, University of Michigan.
Ann Arbor, Mich.
- *RICE, WILLIAM NORTH, Ph.D., LL.D.** Geology.
 Professor of Geology, Wesleyan University.
Middletown, Conn.
- *RILEY, C. V., A.M., Ph.D.** Biology.
 Entomologist of the U.S. Department of Agriculture, and
 Curator of Insects, U.S. National Museum.
Sunbury, Wyoming ave., Washington, D.C.
- RITTER, WILLIAM E., A.M.** Zoölogy.
 Instructor of Zoölogy, University of California.
Berkeley, Cal.
- *ROTHROCK, J. T., M.D., B.S.** Botany.
 Professor of Botany, University of Pennsylvania.
West Chester, Chester Co., Penn.
- *RUSSELL, ISRAEL C.** Geology.
U.S. Geological Survey, Washington, D.C.
- RYDER, JOHN A., Ph.D.** Embryology.
 Professor of Comparative Embryology, University of Pennsylvania.
Philadelphia, Penn.
- *SARGENT, CHARLES S.** Botany.
 Professor of Arboriculture, Harvard University, and Director
 of the Arnold Arboretum.
Brookline, Mass.
- *SCOTT, WILLIAM B., Ph.D.** Animal Morphology.
 Professor of Geology and Palæontology, Princeton College.
Princeton, N.J.
- *SCUDDER, S. H., S.B., A.M.** Entomology and Palæontology.
 Palæontologist, U.S. Geological Survey.
Cambridge, Mass.
- *SEDGWICK, WILLIAM T., Ph.D.** Biology.
 Professor of Biology, Massachusetts Institute of Technology,
 Chief Biologist of the State Board of Health of Massachusetts.
Massachusetts Institute of Technology, Boston, Mass.

- SETCHELL, WILLIAM A., A.B., Ph.D. Botany.
 Assistant in Biology, Yale University.
Yale University, New Haven, Conn.
- SHALER, N. S., A.M., S.D. Palæontology.
 Professor of Geology, Harvard College, and Geologist, U.S.
 Geological Survey.
Cambridge, Mass.
- *SHARP, BENJAMIN, M.D., Ph.D. Animal Morphology.
 Professor of Invertebrate Zoölogy, Academy of Natural
 Sciences of Philadelphia.
Academy of Natural Science, Philadelphia, Penn.
- *SHUFELDT, R. W., M.D., C.M.Z.S. Anatomy of Vertebrates.
 Captain, Medical Department, U.S.A.
Care of Smithsonian Institution, Washington, D.C.
- SMITH, JOHN B. Entomology.
 Professor of Entomology. Entomologist to the College Ex-
 periment Station.
New Brunswick, N.J.
- SMITH, JAMES PERRIN, A.M., Ph.D. Palæontology.
 Assistant Professor of Palæontology, Leland Stanford, Junior,
 University.
Palo Alto, Cal.
- SMITH, ROBERT MEADE, A.M., M.D. Physiology.
 Professor of Comparative Physiology, University of Penn-
 sylvania.
332 South Twenty-first street, Philadelphia, Penn.
- *SMITH, SIDNEY L., Ph.D. Biology.
 Professor of Comparative Anatomy, Yale University.
147 Whalley avenue, New Haven, Conn.
- STILES, CHARLES W., Ph.D. Helminthology.
 Medical Zoölogist, Department of Agriculture, Washington,
 D.C.
Washington, D.C.
- STRONG, OLIVER S., M.A. Biology.
 Preparator in Biology, Columbia College.
New York, N.Y.
- THAXTER, ROLAND, Ph.D. Botany.
 Assistant Professor of Cryptogamic Botany, Harvard Uni-
 versity.
Cambridge, Mass.

- TILTON, JOHN L., A.B. Biology.
 Professor of Natural Science, Simpson Centenary College.
Indianola, Ia.
- *TRUE, FREDERICK W., M.S. Vertebrates.
 Curator of Mammals; U.S. National Museum.
National Museum, Washington, D.C.
- TUCKERMAN, FREDERICK, M.D., B.Sc. Anatomy.
Amherst, Mass.
- TUTTLE, ALBERT H. Biology.
 Professor of Biology, University of Virginia, Va.
Charlottesville, Va.
- *TYLER, J. M., A.B. Zoölogy.
 Professor of Zoölogy and Botany, Amherst College.
Amherst, Mass.
- *VAN VLECK, B. H., S.B. Biology.
 Instructor in Biology and Physiology in Boston University.
Boston Society of Natural History, Boston, Mass.
- VERRILL, A. E., A.M. Zoölogy.
 Professor of Zoölogy, Yale University.
86 Whalley avenue, New Haven, Conn.
- *WADSWORTH, M. E., A.M., Ph.D. Mineralogy, Petrography,
 and Geology.
 Director of the Michigan Mining School, and Professor of
 Mineralogy, Petrography, and Geology; also State Geolo-
 gist of Michigan.
Michigan Mining School, Houghton, Mich.
- *WALCOTT, C. D. Palæontology and Geology.
 Palæontologist, U.S. Geological Survey, and Hon. Curator
 of Invertebrate Palæozoic Fossils, U.S. National Museum.
National Museum, Washington, D.C.
- WARD, HENRY A., A.M. Natural Science.
 Head of Ward's Natural Science Establishment.
16 to 26 College avenue, Rochester, N.Y.
- WARD, HENRY B., A.M., Ph.D. Zoölogy.
 Instructor in Morphology, University of Michigan.
Ann Arbor, Mich.
- *WARREN, J. W., A.B., M.D. Physiology.
 Associate Professor of Physiology, Bryn Mawr College.
Bryn Mawr, Penn.

- WATASE, S., B.S., Ph.D. Biology.
 Reader in Cellular Biology, University of Chicago.
Chicago, Ill.
- WHEELER, WILLIAM M. Embryology.
 Instructor in Embryology, University of Chicago.
Chicago, Ill.
- WHITE, CHARLES D., B.S. Palaeobotany and Geology.
 Assistant Palaeontologist, U.S. Geological Survey.
U.S. National Museum, Washington, D.C.
- WHITFIELD, R. P., M.A. Palaeontology.
 (Late Professor at Troy, N.Y.) Curator of Geology and
 Conchology, American Museum of Natural History.
*American Museum of Natural History, 77th street and
 8th avenue, New York, N.Y.*
- *WHITMAN, C. O., A.M., Ph.D. Animal Morphology.
 Editor "Journal of Morphology;" Director of the Marine
 Biological Laboratory, Woods Hole, Mass.; Professor of
 Biology, University of Chicago.
Chicago, Ill.
- *WILDER, BURT G., B.S., M.D. Vertebrate Morphology.
 Professor of Physiology, Comparative Anatomy, and Zo-
 ology, and Curator of Vertebrate Museum, Cornell Uni-
 versity.
Cornell University, Ithaca, N.Y.
- WILDER, HARRIS H., Ph.D. Zoölogy.
 Professor of Biology, Smith College.
Northampton, Mass.
- WILLEY, ARTHUR, B.A. Biology.
 Assistant in Biology, Columbia College.
New York, N.Y.
- *WILLIAMS, HENRY S., Ph.D. Geology and Palaeontology.
 Professor of Geology and Palaeontology, Cornell University,
 and Assistant Geologist, U.S. Geological Survey.
Cornell University, Ithaca, N.Y.
- *WILSON, EDMUND B., Ph.B., Ph.D. Animal Morphology.
 Adjunct Professor of Biology, Columbia College.
Columbia College, New York City.
- WILSON, HENRY V., A.B., Ph.D. Zoölogy.
 Professor of Biology, University of North Carolina.
Chapel Hill, N.C.

- WILSON, W. P., B.S., D.Sc.** Botany.
 Professor of Physiological Botany, Department of Biology,
 University of Pennsylvania.
Philadelphia, Penn.
- WOLFF, JOHN E., A.B.** Petrography.
 Assistant Professor in Petrography, Harvard University.
15 Story street, Cambridge, Mass.
- WOODWORTH, WILLIAM M., A.B., A.M.** Zoölogy.
 Instructor in Microscopical Anatomy, Harvard University.
149 Brattle street, Cambridge, Mass.
- WORTMAN, J. L.** Vertebrate Palæontology.
 Assistant in Palæontology, American Museum of Natural
 History.
New York, N.Y.
- *WRIGHT, R. RAMSAY, A.M., B.Sc.** Zoölogy.
 Professor of Biology, University of Toronto, Canada.
Biological Department, University of Toronto, Canada.
- YOUmans, W. J., M.D.** Biology.
 Editor of "Popular Science Monthly."
*Office of "Popular Science Monthly," Bond street, New
 York, N.Y.*

Number of honorary members	3
" " members	180
Total	183

ELEVENTH MEETING, PRINCETON, N.J.,

DECEMBER 28-29, 1892.

General sessions held in the Physical Lecture Hall of the John C. Green School of Science.

The American Society of Naturalists held its first formal meeting on Wednesday, December 28, at 2 P.M.

Under the auspices of the Society, Dr. C. Hart Merriam gave an illustrated lecture on "The Death Valley Expedition." The lecture was given Tuesday Evening, December 27, at 8 P.M. After the lecture President Patton tendered a reception to the members of the Society at his home.

The Anatomical, Morphological, and Physiological Societies held meetings at Princeton at the same time.

AFTERNOON SESSION.

WEDNESDAY, DECEMBER 28, 2 P.M.

President Osborn in the chair.

About forty members present.

President Patton, of Princeton, gave an opening address of welcome to the Society. Notification was given that on the next day the question of a *Table at the Naples Station* would be brought before the Society for consideration.

The names of the applicants for membership, recommended by the Executive Committee, were posted, and according to usage were laid over until the next session of the Society. Minutes of meeting of Executive Committee read and accepted.

The report of the Treasurer was read:

BOSTON, Dec. 24, 1892.

WILLIAM T. SEDGWICK, Treasurer, in account with American Society of Naturalists.

DR.

To balance, as per report December 30, 1891,	\$715 55
To dues for year 1892	153 00
	— \$868 55

CR.

EXPENSES FOR YEAR 1892.

Jan. 5, by expenses of Committee on Science Teaching, through W. N. Rice	\$20 52
Feb. 21, by Table at Naples Zoölogical Station, through C. W. Stiles	100 00
March 3, by expenses of Philadelphia meeting, H. H. Donaldson, Secretary	28 93
March 10, Thomas Todd, printing of assessment notices	2 00
March 10, Charles Hamilton, printing of annual meeting notices	11 80
May 16, Rockwell & Churchill, printing annual records	67 56
May 16, Rockwell & Churchill, printing of Report of Science Committee	16 00
Dec. 24, W. T. Sedgwick, Treasurer, postage and stationery	6 75
	— 253 56
Balance	\$614 99

WILLIAM T. SEDGWICK,
Treasurer.

A committee of two, Professor Libbey and Dr. Rankin, were appointed to audit the Treasurer's report.

Professor Cope suggested that a committee of five be appointed by the Chair to consider whether the Anatomical and Morphological Societies could not be united into a single body.

Professor Minot offered an amendment to Professor Cope's motion, viz., that a committee be appointed to confer with the Executive Committees of the other societies, to bring about a closer affiliation of the Anatomists and Morphologists. Carried.

The President appointed Professors Cope, Allen, Minot, McMurrich, and Sedgwick on the committee.

Professor Sedgwick read a report from Professor Clark, Chairman of the Committee on Science Teaching in the Schools.

The Committee on Science Teaching in the Schools beg leave to submit the following report :

Five hundred copies of their Report for December, 1891, have been distributed to the Universities, Colleges, and Fitting Schools, to the leading papers, and to the educational journals.

The memorandum voted at the meeting of the Association of Colleges in New England, held at Brown University November, 1891, was discussed at the meeting of that Association in November of this year. The recommendations in that memorandum were as follows :

" 1. The introduction of Elementary Natural History into the earlier years of the programme as a substantial subject, to be taught by demonstrations and practical exercises rather than from books.

" 2. The introduction of Elementary Physics into the later years of the programme as a substantial subject, to be taught by the experimental or laboratory method, and to include exact weighing and measuring by the pupils themselves.

" 3. The introduction of Elementary Algebra at an age not later than twelve years.

" 4. The introduction of Elementary Plane Geometry at an age not later than thirteen years.

" 5. The offering of opportunity to study French, or German, or Latin, or any two of these languages, from and after the age of ten years.

In order to make room in the programme for these new subjects, the Association recommends that the time allotted to Arithmetic, Geography, and English Grammar be reduced to whatever extent may be necessary.

"The Association makes these recommendations in the interest of the public-school system as a whole; but most of them are offered more particularly in the interest of those children whose education is not to be continued beyond the Grammar School."

While there was considerable diversity in the opinions expressed, a large majority were in favor of the several propositions. If I remember rightly, there were only two who were opposed to the general plan. While your Committee was not officially represented at that meeting, it has urged upon that body, as upon the several College Faculties, a consideration of this subject, which makes it natural and reasonable to have reported the views of that organization here.

Under the auspices of the National Council of Education a committee of ten, representing the leading colleges and secondary schools in different parts of the country, has been formed. This committee of ten has appointed nine sub-committees to hold conferences on the following subjects: 1, Latin. 2, Greek. 3, English. 4, Other modern languages. 5, Mathematics. 6, Physics, Astronomy, and Chemistry. 7, Natural History (Biology, including Botany, Zoölogy, and Physiology). 8, History, Civil Government, and Political Economy. 9, Geography (Physical Geography, Geology, and Meteorology). Each conference is "to consider the proper limits of its subject, the best methods of instruction, the most desirable allotment of time for the subject, and the best methods of testing pupils' attainments therein; and each conference to represent fairly the different parts of the country." The results of these various conferences are to be submitted by the committee of ten to the National Council of Education.

Your Committee is represented on the committee of ten for the department of Natural History, whose first meeting takes place in Chicago, December 28, 1892.

It is a pleasure to note the steady growth in extent and vigor of our cause in all our educational circles. It is a cause which this Society, since its founding, has supported, and which we will, I trust, continue to encourage in every possible way, in the more difficult work which is to come.

There has now been awakened a stronger and more widespread interest in having science studies introduced in the elementary and

high school courses. It is recognized that if this be wisely done, the congested condition of the work in High School and College will be greatly relieved, the student will be farther advanced in the course at any given age, and will possess a better-trained mind.

Better teaching, of course, is much needed, but it is an encouraging fact that a larger number of good teachers is available every year. We are beginning to see efforts being made to establish these improvements in the schools. These attempts need encouragement from every one who is connected with this department of work. It is possible for every member of the Society to do something towards furthering the progress of this movement toward better things. A great deal may be done by friendly talks with Principals, Head-Masters, and Science Teachers in one's own neighborhood.

Your Committee have been doing that in addition to their concerted work, and we would respectfully and earnestly suggest that every member of the Society do that much for the cause to which all of us give our life work.

SAMUEL F. CLARKE,
Chairman.

Report accepted and committee continued.

Professors Sidney Smith, Pillsbury, and Sedgwick reported successful results already reached through the efforts of the Committee on Science Teaching.

The President appointed a Committee for the Election of Officers for the ensuing year, as follows: Prof. E. L. Mark, Dr. E. A. Andrews, Prof. W. H. Brewer, Dr. C. Hart Merriam, Prof. W. T. Sedgwick.

Addresses on Marine Biological Laboratories were given as follows:

DR. E. A. ANDREWS, Johns Hopkins University — "A Marine Station in Jamaica."

DR. BASIFORD DEAN, Columbia College — "The Marine Laboratories of Europe." Illustrated by stereopticon.

PROF. C. O. WHITMAN, University of Chicago — "The Outlook for a Marine Observatory at Woods Hole."

Prof. Minot moved "that the Executive Committee be authorized, with Dr. Whitman's permission, to secure reprints of his article on 'A Marine Biological Observatory at Woods Holl,' to distribute to members of the Society, and to such other persons as the committee shall deem advisable."

Motion carried unanimously.

Dr. Stiles reported that during the past year the American Table at Naples, toward the support of which the American Society of Naturalists had subscribed, had been occupied by Prof. E. B. Wilson and Dr. G. W. Field. Dr. Stiles said that a memorial had been sent out already, urging the need of such a table, and that it had been signed by over one hundred teachers of biology.

Prof. C. O. Whitman presented a motion to the effect that it was the opinion of the Society that this country should be represented by at least one table at the Naples Zoölogical Station.

Professor E. B. Wilson read a letter from Dr. Eisig, of Naples, written in answer to inquiries, showing that, since the foundation of the Naples Laboratory, eleven Americans had occupied foreign tables, while only five had occupied American tables.

Professor Whitman's motion was re-read :

- (1) That it is the opinion of the American Society of Naturalists that America should be represented by a table at the Naples Station.
- (2) That the Society indorse the preamble of the memorial.
- (3) That the President appoint a committee of three to convey these resolutions to the Smithsonian Institution.

WHEREAS, A memorial, signed by most of the working biologists throughout this country, is to be presented to the Secretary of the Smithsonian Institution, at Washington, D.C., petitioning that the Institution support a table at the Zoölogical Station at Naples, Italy, for three or five years; and

WHEREAS, Said Station is in every sense an international institution, devoted exclusively to advanced research, and open to all countries on the same terms; and

WHEREAS, In the opinion of this Society it is of high impor-

tance that American biologists should have the unequalled facilities of said Station; and

WHEREAS, The representation from America should be placed on an official and national basis; be it

Resolved (1) That, in the opinion of this Society, this country should be continuously represented at said Station by at least one table; and be it

Resolved (2) That this Society give to the aforesaid petition its hearty and unqualified indorsement; and be it

Resolved (3) That the President of this Society be empowered to appoint a committee of three members, who shall have power to act for the Society in promoting the above project.

C. O. WHITMAN,
EDM. B. WILSON.

Motion carried. Committee appointed: C. O. Whitman, E. B. Wilson, C. W. Stiles.

Adjourned.

WEDNESDAY, 8 P.M.

Annual dinner of the Society, in University Hall.

The President's Address. — Professor Henry F. Osborn, Columbia College.

MORNING SESSION.

THURSDAY, DECEMBER 29, 9.30 A.M.

Professor Macloskie moved that the Secretary be instructed to cast the vote of the Society for the applicants recommended by the Executive Committee. Carried.

The following were admitted to membership in the Society:

HOWARD AYERS, Ph.D., Director of the Lake Laboratory.

J. H. BAMHART, A.B., Curator Museum Wesleyan University.

G. N. CALKINS; B.S., Assistant Biologist, State Board of Health of Massachusetts.

F. M. CHAPMAN, Assistant Curator Mammalogy and Ornithology, American Museum Natural History.

BASHFORD DEAN, Ph.D., Assistant in Biology, Columbia College.

D. G. ELLIOT, American Museum of Natural History.

B. D. HALSTED, D.Sc., Botanist and Horticulturist at the Agricultural Station, New Brunswick, N.J.

IDA A. KELLAR, Ph.D., Lecturer of Botany, Bryn Mawr College.

EDWIN LINTON, A.M., Ph.D., Professor of Geology and Biology, Washington and Jefferson College.

T. P. LOTSIV, Ph.D., Fellow by Courtesy, Johns Hopkins University.

J. I. PECK, A.M., Assistant in Biology, Williams College.

H. S. PRATT, Ph.D., Holder of Townsend Scholarship, Harvard University.

J. E. REIGHARD, Professor of Animal Morphology, University of Michigan.

WILLIAM E. RITTER, A.M., Instructor of Zoölogy, University of California.

J. P. SMITH, A.M., Ph.D., Assistant Professor of Palæontology, Leland Stanford, Junior, University.

O. S. STRONG, M.A., Preparator in Biology, Columbia College.

R. THAXTER, Ph.D., Assistant Professor of Cryptogamic Botany, Harvard University.

H. H. WILDER, Ph.D., Professor of Biology, Smith College.

ARTHUR WILLEY, B.A., Assistant in Biology, Columbia College.

J. L. WORTMAN, M.D., Assistant in Palæontology, American Museum of Natural History.

The committee appointed to consider the question of a closer union between the American Society of Naturalists and the Anatomical, Morphological, Physiological, and Geological Societies reported as follows:

Recommend that the Society of Naturalists invite the Morphological, Anatomical, Physiological, and Geological Societies to unite with them in a general association of professional naturalists, with a common treasury and a common general secretary, and to effect a union at the next annual meeting, on terms to be deter-

mined by a committee of conference of two from each society. The Society of Naturalists also suggests that fusion of the Anatomical and Morphological Societies might prove advantageous to all concerned.

The report presented by the committee (given above) was then discussed by members of the Society.

Professors Cope, Macloskie, Osborn, Sedgwick, Howell, Merriam, Libbey, and other members took part.

It was agreed to consider the report in two parts, the first part extending to "The Society of Naturalists also suggest," etc.

Professor Libbey offered as a substitute to the first part of the report this statement: "That a committee be appointed to attempt to bring about an affiliation of the Physiological, Morphological, Anatomical, and Geological Societies with this body."

Vote taken by the Society on the amendment. Carried.

Professor Libbey explained that the indefinite form of the motion gave the Executive Committee freedom of action in the matter.

Professor Merriam moved that the matter be referred to the Executive Committee with power to act. Carried.

Second part of Professor Cope's original motion was taken into consideration.

Professor Minot moved that this be also referred to the Executive Committee with power to act. Carried.

The President reports from the Executive Committee that New Haven, Conn., is considered the most appropriate place of meeting for the next — twelfth — annual meeting.

An amendment to the Constitution, Art. IV., Sec. 1, was proposed by Professor J. Playfair McMurrich and seconded by Professor William Libbey, Jr., as follows:

After the word "Maryland" the word "and" be omitted, and after the words "District of Columbia" the words "Ohio, Indiana, Michigan, and Illinois be inserted."

After a short discussion, it was agreed to let the motion for amendment stand over till the next meeting of the society.

The committee for nomination of officers for the ensuing year reported as follows:

President. — R. H. CHITTENDEN, New Haven, Conn.

Vice-Presidents. — GEORGE BAUR, Chicago, Ill.

WILLIAM H. DALL, Washington, D.C.

WILLIAM LIBBEY, JR., Princeton, N.J.

Secretary. — T. H. MORGAN, Bryn Mawr, Pa.

Treasurer. — W. T. SEDGWICK, Boston, Mass.

Committee at Large. — W. G. FARLOW, Cambridge, Mass.

JOHN A. RYDER, Philadelphia, Pa.

E. L. MARK,

Chairman Committee on Nomination.

It was moved that the Secretary be instructed to cast the ballot for the above officers. Carried.

It was moved that the place of meeting of the Society for 1893 be left to the decision of Executive Committee. Carried.

Special reports were then heard.

“The Summer Work of the United States Fish Commission Schooner ‘Grampus,’” Professor William Libbey, Jr., Princeton College.

“Expeditions of the American Museum of Natural History into New Mexico, Wyoming, and Dakota,” Dr. J. L. Wortman, American Museum of Natural History.

Report of a recent Palaeontological Expedition, Professor E. D. Cope.

The committee appointed to audit the Treasurer’s report announced :

The undersigned, having examined the account-book of W. T. Sedgwick, Treasurer American Society of Naturalists, and having compared the accounts with the vouchers submitted, report that they find the accounts correct.

Respectfully submitted,

WILLIAM LIBBEY, JR.,

WALTER M. RANKIN.

A report was read from Professor Wilder, of Cornell, in which he drew the attention of the Committee on Science Teaching to the fact that examinations in Physiology had long been required for admission to Cornell University. Typical examination papers were also submitted.

THIRD SESSION.

THURSDAY, DECEMBER 29, 2 P.M.

Annual discussion.

Subject: "What were the Former Areas and Relations of the American Continent, as determined by Faunal and Floral Distribution?"

"Introduction and Evidences from Past and Present Distribution of Mammals" — Professor W. B. Scott, Princeton College.

"Evidence from the Distribution of Birds" — Professor J. A. Allen, American Museum of Natural History.

"Evidence from the Distribution of Plants" — Dr. N. L. Britton, Columbia College.

In the *general* discussion that followed the reports, the following members took part:

Professors Libbey, Merriam, Cope, Osborn, Morse, Brewer, Conn, Sedgwick, McMurrich, Ryder.

Professor Sedgwick moved that the Society extend to the local committee, to the Nassau Club, and to the officers of Princeton College, thanks for their hospitable reception and entertainment of the Society. Carried unanimously.

The society adjourned until the next annual meeting.

R E C O R D S
OF THE
AMERICAN SOCIETY
OF
N A T U R A L I S T S.

VOLUME I.

PART ELEVEN.

BOSTON:
PUBLISHED BY THE SECRETARY.
1894.



RECORDS.



LIST OF OFFICERS FOR 1894.

President, C. S. MINOT.

Vice-Presidents. { W. H. DALL,
WILLIAM LIBBEY, Jr.,
SIDNEY I. SMITH.

Secretary, W. A. SETCHELL.

Treasurer, E. G. GARDINER.

*Members of the Executive Committee elected from the
Society at large.*

H. F. OSBORN.

C. W. STILES.

LIST OF HONORARY MEMBERS.

*DANA, JAMES D., Ph.D., LL.D., Mineralogy, Zoölogy, Geology.

Professor of Geology, Yale University.

Yale University, New Haven, Conn.

LESLEY, J. P., A.M., LL.D. **Geology.**

State Geologist of Pennsylvania.

Geology.

907 Walnut street, Philadelphia, Penn.

RSH, O. C., Ph.D., LL.D.

Professor of Palaeontology, Yale University.

8 Peabody Museum, New Haven, Conn.

81 Cabbell Museum, New Haven, Conn.

LIST OF MEMBERS.

[An asterisk designates original membership.]

- ***ALLEN, HARRISON, M.D.** Comparative Anatomy.
1933 *Chestnut street, Philadelphia, Penn.*
- ALLEN, J. A., Ph.D.** Mammalogy and Ornithology.
Curator of the Department of Vertebrate Zoölogy, Ameri-
can Museum of Natural History, New York.
77th street and 8th avenue, New York, N.Y.
- ALLIS, EDWARD P., Jr.** Biology.
Associate Editor of the "Journal of Morphology."
Milwaukee, Wis.
- ANDREWS, E. A., Ph.D.** Biology.
Associate Professor in Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- AYERS, HOWARD, Ph.D.** Biology.
Director Lake Laboratory, Milwaukee, Wis.
- BARNHART, JOHN H., A.B., A.M.** Biology.
Tarrytown, N.Y.
- BARTON, B. W., M.D.** Botany.
Instructor in Botany, Johns Hopkins University.
University Club, Charles street, Baltimore, Md.
- BAUR, GEORGE, Ph.D.** Vertebrate Palaeontology.
Assistant Professor of Comparative Osteology and Palaeon-
tology, University of Chicago
University of Chicago, Chicago, Ill.
- ***BICKMORE, ALBERT S.**
Secretary and Professor in charge of Department of Public
Instruction of the American Museum of Natural History.
American Museum, Central Park, N.Y.
- BIGELOW, R. P., Ph.D.** Animal Morphology.
Instructor in Biology, Massachusetts Institute of Technology.
Institute of Technology, Boston, Mass.

- BOLTON, H. CARRINGTON, A.M., Ph.D. Mineralogy, Chemistry.
University Club, New York City.
- *BOWDITCH, HENRY P., A.M., M.D. Physiology.
 Professor of Physiology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- BRANNER, JOHN CASPER, A.M., Ph.D. Geology.
 Professor of Geology, Leland Stanford Junior University.
Palo Alto, Cal.
- BREWER, WILLIAM H., Ph.D. Biology.
 Professor of Agriculture, Yale University.
418 Orange street, New Haven, Conn.
- *BRUSH, G. J. Mineralogy.
 Director, Sheffield Scientific School.
New Haven, Conn.
- BUMPUS, H. C., Ph.D. Comparative Anatomy.
 Associate Professor of Zoölogy, Brown University.
Brown University, Providence, R.I.
- BUSH, KATHARINE J. Zoölogy.
 Assistant in Peabody Museum of Yale University.
New Haven, Conn.
- CALKINS, G. N., B.S. Biology.
Columbia College, New York, N.Y.
- CAMPBELL, JOHN P., Ph.D. Physiology.
 Professor of Biology, University of Georgia, Athens, Ga.
- CASEY, THOMAS L. Entomology.
 Captain, U.S. Engineer Corps.
U.S. Army Building, New York, N.Y.
- CHAPMAN, FRANK M. Mammalogy and Ornithology.
 Assistant Curator, American Museum of Natural History.
77th street and 8th avenue, New York, N.Y.
- CHITTENDEN, R. H., Ph.D. Physiology.
 Professor of Physiological Chemistry, Yale University.
83 Trumbull street, New Haven, Conn.
- COE, WESLEY R., Ph.B. Zoölogy.
 Assistant in Biology, Yale University.
New Haven, Conn.
- CLARK, WILLIAM B., Ph.D. Palæontology.
 Associate in Palæontology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.

- *CLARKE, SAMUEL F., Ph.B., Ph.D. Zoölogy.
Professor of Natural History, Williams College.
Williamstown, Mass.
- *CONN, H. W., Ph.D. Zoölogy; Bacteriology.
Professor of Biology, Wesleyan University.
Middletown, Conn.
- *COPE, EDWARD D. Vertebrate Palæontology and Zoölogy.
Professor of Vertebrate Palæontology, University of Pennsylvania.
2102 Pine street, Philadelphia, Penn.
- *COUES, ELLIOTT, A.M., M.D., Ph.D. Vertebrates, Bibliography.
1726 H street, Washington, D.C.
- DALL, WILLIAM HEALEY. Mollusca, Palæontology.
Palæontologist, U.S. Geological Survey, Honorary Curator
Department of Mollusks, U.S. National Museum.
Smithsonian Institution, Washington, D.C.
- DAVENPORT, CHARLES B., A.B., A.M. Zoölogy.
Instructor in Zoölogy, Harvard University.
Cambridge, Mass.
- DEAN, BASHFORD, Ph.D. Vertebrate Zoölogy.
Assistant in Biology.
Columbia College, New York, N.Y.
- *DIMMOCK, GEORGE, Ph.D. Zoölogy.
Canobie Lake, N.H.
- DOLLEY, CHARLES S. Biology.
Professor of Natural History in Swarthmore College.
Woodland avenue, Philadelphia, Penn.
- *DONALDSON, HENRY H., Ph.D. Physiology.
Professor of Neurology, University of Chicago.
Chicago, Ill.
- *DUDLEY, W. R., M.S. Cryptogamic Botany.
Professor of Botany, Leland Stanford Junior University.
Palo Alto, Cal.
- DWIGHT, THOMAS, A.M., M.D. Anatomy.
Parkman Professor of Anatomy, Harvard Medical School.
235 Beacon street, Boston, Mass.
- *DWIGHT, WILLIAM B., A.B., A.M., Ph.B. Palæontology.
Professor of Natural History and Curator of the Museum,
Vassar College.
Vassar College, Poughkeepsie, N.Y.

- EATON, DANIEL C., M.A. Botany.
 Professor of Botany, Yale University.
70 Sachem street, New Haven, Conn.
- EDWARDS, CHAS. L., A.M., Ph.D. Zoölogy.
 Professor of Zoölogy, University of Texas.
Austin, Texas.
- ELLIOT, D. G. Mammalogy and Ornithology.
American Museum Natural History, New York, N.Y.
- *EMERSON, B. K., Ph.D. Geology and Mineralogy.
 Professor of Geology, Amherst College.
Amherst, Mass.
- *EMERTON, JAMES H. Zoölogy.
11 St. James avenue, Boston, Mass.
- ERNST, HAROLD C., A.M., M.D. Bacteriology.
 Assistant Professor of Bacteriology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- EVANS, ALEXANDER W., Ph.B., M.D. Botany.
 House Surgeon, New Haven Hospital.
12 High street, New Haven, Conn.
- *FARLOW, WM. G., A.B., M.D. Botany.
 Professor of Cryptogamic Botany, Harvard University.
Harvard University, Cambridge, Mass.
- *FERNALD, C. H., A.M., Ph.D. Microlepidoptera.
 Professor of Zoölogy, Massachusetts Agricultural College.
Amherst, Mass.
- FERNALD, HENRY T., M.S., Ph.D. Morphology.
 Professor of Zoölogy, Pennsylvania State College.
State College, Centre Co., Penn.
- FERRIS, HARRY B. Anatomy.
 Assistant Professor of Anatomy, Yale Medical School.
New Haven, Conn.
- FEWKES, J. WALTER. Ethnology.
73 Pinckney street, Boston, Mass.
- FIELD, GEORGE WILTON, A.B., A.M., Ph.D. Morphology.
 Associate Professor of Cellular Biology.
Brown University, Providence, R.I.
- Fox, L. WEBSTER, M.D. Anatomy and Physiology.
 Clinical Assistant, Jefferson Medical College Hospital,
 Ophthalmic Surgeon to Germantown Hospital.
1304 Walnut street, Philadelphia, Penn.

- FROTHINGHAM, LANGDON, M.D.V. Bacteriology.
 Assistant in Veterinary Science and Bacteriology, Yale
 University.
 2 Hill house avenue, New Haven, Conn.
- FULLER, GEORGE W., S.B. Bacteriology.
 Chief Assistant-Biologist, State Board of Health of Massa-
 chusetts.
 Lawrence, Mass.
- *GAGE, SIMON H., S.B. Vertebrate Morphology and Physiology.
 Associate Professor of Physiology and Lecturer on Micro-
 scopical Technology, Cornell University.
 Cornell University, Ithaca, N.Y.
- GANONG, WM. FRANCIS. Biology.
 119 Oxford street, Cambridge, Mass.
- GARDINER, EDWARD G., S.B., Ph.D. Zoölogy.
 12 Otis place, Boston, Mass.
- GARDINER, FREDERIC, A.B., A.M. Biology.
 Instructor in Natural Science, Trinity College,
 Pomfret, Conn.
- *GERRISH, FREDERIC HENRY, A.M., M.D. Anatomy.
 Professor of Anatomy, Bowdoin College..
 675 Congress street, Portland, Me.
- *GILBERT, G. K. Geology.
 Geologist of the U.S. Geological Survey.
 U.S. Geological Survey, Washington, D.C.
- *GOODALE, GEORGE L., A.M., M.D. Botany.
 Professor of Botany, Harvard University.
 10 Craigie street, Cambridge, Mass.
- *GOODE, G. BROWN, A.M., Ph.D. Zoölogy.
 Assistant Secretary of the Smithsonian Institution in charge
 of the U.S. National Museum.
 Smithsonian Institution, Washington, D.C.
- GRATACAP, L. P., M.A., Ph.B. Mineralogy and Geology.
 Assistant Curator of Geology, American Museum of Natural
 History, New York.
 77th street and 8th avenue, New York, N.Y.
- *GREENLEAF, R. W., A.M., M.D. Botany.
 561 Boylston street, Boston, Mass.
- GREGORY, EMILY L., Ph.D. Botany.
 343 Madison avenue, New York, N.Y.

- HAGUE, ARNOLD.** Geology and Petrography.
 Geologist, U.S. Geological Survey.
U.S. Geological Survey, Washington, D.C.
- ***HALL, JAMES M. S., A.M., M.D., LL.D.** Geology, Palæontology.
 State Geologist of New York, Director of the State Museum
 of Natural History.
State Museum, Albany, N.Y.
- HALSTED, BYRON D., D.Sc.** Botany.
 Botanist and Horticulturist, Agricultural Experiment Station.
New Brunswick, N.J.
- HARE, HOBART AMORY, B.Sc., M.D.** Physiology.
 Professor of Therapeutics in Jefferson Medical College of
 Philadelphia.
222 South Fifteenth street, Philadelphia, Penn.
- HARGITT, CHARLES W., Ph.D.** Zoölogy.
 Professor of Biology, Syracuse University.
Syracuse University, Syracuse, N.Y.
- HARRISON, ROSS GRANVILLE, A.B.** Animal Morphology.
 Fellow of Johns Hopkins University.
Baltimore, Md.
- ***HEILPRIN, ANGELO.** Palæontology and Geology.
 Professor of Invertebrate Palæontology at, and Curator in
 Charge of, the Academy of Natural Sciences of Phila-
 delphia, and Professor of Geology at the Wagner Free
 Institute of Science.
Academy of Natural Sciences, Philadelphia, Penn.
- HENCHMAN, ANNIE P.** Zoölogy.
8 Frisbie place, Cambridge, Mass.
- ***HENSHAW, SAMUEL.** Zoölogy.
 Secretary, Boston Society of Natural History.
Boston Society of Natural History, Boston, Mass.
- HERRICK, F. H., A.B., Ph.D.** Biology.
 Professor of Biology, Adelbert College.
Adelbert College, Cleveland, O.
- HILL, FRANK A.** Geology.
 Geologist in Charge, Anthracite District, State Survey of
 Pennsylvania.
1011 South 48th street, Philadelphia, Penn.

- *HITCHCOCK, C. H., Ph.D. Geology.
 Professor of Geology and Mineralogy, Dartmouth College.
Hanover, N.H.
- HODGE, CLIFTON F., A.B., Ph.D. Physiology.
 Clark University.
Worcester, Mass.
- HOUGH, THEODORE, B.A., Ph.D. Biology.
 Instructor in Physiology, Massachusetts Institute of Technology.
Massachusetts Institute of Technology, Boston, Mass.
- HOWELL, WILLIAM H., A.B., Ph.D. Physiology.
 Professor of Physiology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- *HYATT, ALPHEUS, S.B. Palæontology and Zoölogy.
 Curator of the Boston Society of Natural History, and Assistant
 in Museum of Comparative Zoölogy, at Cambridge, Mass.
Boston Society of Natural History, Boston, Mass.
- IDDINGS, JOSEPH P., Ph.B. Geology and Petrography.
 Associate Professor of Geology, University of Chicago.
University of Chicago.
- IVES, J. E. Invertebrate Zoölogy.
 Assistant to the Curator in Charge of the Academy of Natural Sciences of Philadelphia.
Academy of Natural Sciences, Philadelphia, Pa.
- JACKSON, ROBERT TRACY, S.B., S.D. Zoölogy and Palæontology.
33 Gloucester street, Boston, Mass.
- JAYNE, HORACE, M.D. Vertebrata.
 Professor of Vertebrate Morphology, University of Pennsylvania.
1826 Chestnut street, Philadelphia, Penn.
- JOHNSON, HERBERT P., A.M. Biology.
University of Chicago.
- JORDAN, DAVID STARR. Biology.
 President of Leland Stanford Junior University.
Palo Alto, Cal.
- JORDAN, EDWIN O., S.B., Ph.D. Biology.
 Tutor in Anatomy, University of Chicago.
Chicago, Ill.

- *JULIEN, ALEXIS A., Ph.D. Biology and Petrography.
Instructor in Biology and Microscopy, School of Mines,
Columbia College.
School of Mines, Columbia College, New York, N.Y.
- KEITH, SIMEON C., Jr. Assistant in Biology, Massachusetts Institute of Technology.
Massachusetts Institute of Technology, Boston, Mass..
- KELLAR, IDA A., Ph.D. Botany.
Academy of Natural Science, Philadelphia, Penn.
- KINGSLEY, J. S., D.Sc. Zoölogy.
Professor Zoölogy, Tufts College.
College Hill, Mass.
- KNOWLTON, FRANK H., M.S. Geology.
U.S. Geological Survey, Washington, D.C.
- LANE, ALFRED CHURCH, A.M., Ph.D. Petrography and
Geology.
Instructor in Petrography and Geology, Michigan Mining
School, and Assistant on Michigan Geological Survey.
Houghton, Mich.
- LEE, F. S., A.M., Ph.D. Physiology.
Demonstrator of Physiology, Columbia College, Medical
Department.
College of Physicians and Surgeons, New York City.
- *LEE, LESLIE A., Ph.D. Geology and Biology.
Professor of Geology and Biology, Bowdoin College.
Brunswick, Me.
- LEE, THOMAS G., B.S., M.D. Biology.
Professor of Histology and Embryology, University of Min-
nesota.
Minneapolis, Minn.
- *LIBBEY, WILLIAM, Jr., A.M., D.Sc. Histology.
Professor of Physical Geography, Princeton College, and
Director of the E. M. Museum of Geology and Archæ-
ology.
Princeton, N.J.
- LINTON, EDWIN, Ph.D. Zoölogy.
Professor of Geology and Biology, Washington and Jefferson
College.
Washington, Penn.

- LORTV, T. P., Ph.D. Botany.
Associate, Johns Hopkins University.
Baltimore, Md.
- LUCAS, FREDERIC A. Avian Osteology.
Curator, Department of Comparative Anatomy, U.S. National Museum.
Washington, D. C.
- LUSK, GRAHAM, Ph.D. Physiology.
Assistant Professor of Physiology, Yale Medical School.
New Haven, Conn.
- MACFARLANE, JOHN M., B.S., D.Sc. Botany.
Professor of Biology, University of Pennsylvania.
Lansdowne, Penn., or Department of Biology, University of Pennsylvania, Philadelphia, Penn.
- *MACCOSKIE, GEORGE, D.Sc., LL.D. Biology.
Professor of Biology, Princeton College.
Princeton, N.J.
- MALL, F. P., M.D. Histology and Vertebrate Embryology.
Professor of Anatomy, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- MARK, EDWARD L., A.M., Ph.D.
Hersey Professor of Anatomy, Harvard University.
21 North avenue, Cambridge, Mass.
- *MARSHALL, JOHN P., A.M. Mineralogy and Geology.
Professor of Mineralogy and Geology, Tufts College.
College Hill, Mass.
- *MARTIN, H. NEWELL, A.M., M.D., D.Sc., F.R.S. Physiology.
Physiological Laboratory, University of Cambridge.
Cambridge, England.
- McCLURE, CHARLES F. W., A.B. Embryology and Vertebrate Morphology.
Instructor in Biology at Princeton College.
Princeton, N.J.
- *McGEE, W. J. Geology.
Geologist, U.S. Geological Survey.
U. S. Geological Survey, Washington, D. C.
- McMURRICH, J. PLAYFAIR, A.M., Ph.D. Animal Morphology.
Professor of Biology, University of Cincinnati.
Cincinnati, Ohio.

- ***MEEHAN, THOMAS.** Botany.
 Botanist to the Pennsylvania State Board of Agriculture;
 Vice-President, Academy of Natural Sciences, Philadelphia.
Germantown, Penn.
- MELTZER, S. J., M.D.** Physiology.
66 East 124th street, New York City.
- MENDEL, LAFAYETTE B., Ph.D.** Physiology.
 Assistant in Physiological Chemistry, Yale University.
New Haven, Conn.
- ***MERRIAM, C. HART, M.D.** Mammals and Birds.
 Chief of Division of Economic Ornithology and Mammalogy
 of the U.S. Department of Agriculture, and Secretary of
 the American Ornithologists' Union.
Washington, D.C.
- ***MERRILL, F. J. H., Ph.D.** Geology.
 Assistant State Geologist, State Museum.
Albany, N.Y.
- ***MERRILL, GEORGE P., M.S.** Lithology.
 Curator, Department of Geology, U.S. National Museum.
National Museum, Washington, D.C.
- MILLS, T. WESLEY, M.D.** Biology.
 Professor of Physiology, McGill University.
Côte St. Antoine, Montreal, Canada.
- ***MINOT, CHARLES SEDGWICK, S.B., S.D.** Biology.
 Professor of Histology and Human Embryology, Harvard
 Medical School.
Harvard Medical School, Boston, Mass.
- MIXTER, SAMUEL J., B.S., M.D.** Anatomy.
180 Marlborough street, Boston, Mass.
- MORGAN, THOS. HUNT, B.S., Ph.D.** Biology.
 Associate Professor of Biology, Bryn Mawr College.
Bryn Mawr, Penn.
- ***MORSE, EDWARD S., Ph.D.** Anthropology and Zoölogy.
 Director of the Peabody Academy of Science, Salem, Mass.
Salem, Mass.
- MÜNSTERBERG, HUGO, M.D., Ph.D.** Psychology.
 Professor of Experimental Psychology, Harvard University.
38 Quincy street, Cambridge, Mass.

- NICHOLS, HERBERT, Ph.D. Psychology.
 Instructor in Psychology, Harvard University.
12 Kirkland place, Cambridge, Mass.
- NICKERSON, WINFIELD S., B.Sc. Zoölogy.
 Assistant in Zoölogy, Harvard College.
Cambridge, Mass.
- *NILES, WILLIAM H., Ph.B., A.M. Physical Geography and Historical Geology.
 Professor of Geology and Geography, Massachusetts Institute of Technology.
Massachusetts Institute of Technology, Boston, Mass.
- O'GRADY, MARCELLA I., S.B. Professor of Biology, Vassar College.
Vassar College, Poughkeepsie, N.Y.
- OLIVER, CHARLES A., A.M., M.D. Special Sense Morphology and Physiology.
 Surgeon to Wills Eye Hospital and Ophthalmic Surgeon to the Presbyterian Hospital.
1507 Locust street, Philadelphia, Penn.
- *OSBORN, HENRY FAIRFIELD, Sc.D. Vertebrate Morphology.
 Da Costa Professor of Biology, Columbia College, Curator of Department of Mammalian Palaeontology, American Museum of Natural History, N.Y.
American Museum of Natural History, New York City.
- OSTERHOUT, WINTHROP J. V., A.B. Botany.
 Instructor in Botany, Brown University.
Brown University, Providence, R.I.
- *PACKARD, A. S., A.M., M.D., Ph.D. Zoölogy.
 Professor of Zoölogy and Geology, Brown University.
Brown University, Providence, R.I.
- PATTEN, WILLIAM, B.S., Ph.D., A.M. Professor of Zoölogy, Dartmouth College.
Hanover, N.H.
- PARKER, GEORGE HOWARD, S.B., S.D. Animal Morphology.
 Instructor in Zoölogy, Harvard University.
8 Harris street, North Cambridge, Mass.
- *PEALE, A. C., A.M., M.D. Geology.
 Geologist, U.S. Geological Survey.
Geological Survey, Washington, D.C.

- PECK, JAMES I., A.M. Zoölogy.
 Assistant in Biology, Williams College.
Williamstown, Mass.
- *PECKHAM, GEORGE W., M.D. Biology.
 Teacher of Biology, Milwaukee High School.
646 Marshall street, Milwaukee, Wis.
- PENFIELD, SAMUEL L., Ph.B. Mineralogy.
 Assistant Professor of Mineralogy, Yale University.
Peabody Museum, New Haven, Conn.
- PHILLIPS, ALEXANDER H., S.B. Vertebrate Anatomy.
 Instructor in Biology at Princeton College.
Princeton, N.J.
- *PILLSBURY, J. H. Biology.
50 Mattoon street, Springfield, Mass.
- PRATT, HENRY S., Ph.D. Zoölogy.
 Instructor in Biology, Haverford College.
Haverford, Pa.
- *PRENTISS, A. N., S.M. Botany.
 Professor of Botany, Horticulture, and Arboriculture, Cornell University.
Cornell University, Ithaca, N.Y.
- PROSSER, CHARLES S., S.M. Geology and Palæontology.
 Professor of Geology, Washburn College.
Topeka, Kan.
- *PUTNAM, FREDERICK W. Archæology and Ethnology.
 Peabody Professor of American Archæology and Ethnology,
 Harvard University; Curator of the Peabody Museum of
 Archæology and Ethnology, in connection with Harvard
 University; Permanent Secretary of the American Association
 for the Advancement of Science; and Massachusetts
 State Commissioner on Inland Fisheries.
Peabody Museum, Cambridge, Mass.
- RANKIN, WALTER M., A.M., M.Sc., Ph.D. Biology.
 Instructor in Biology and Curator of Museum, Princeton
 College.
60 University place, Princeton, N.J.
- *RATHBUN, RICHARD, S.M. Invertebrates.
 Curator, Dep't of Marine Invertebrates, National Museum.
U.S. Fish Commission, Washington, D.C.

- REICHART, EDWARD T., M.D. Physiology.
 Professor of Physiology, University of Pennsylvania.
University of Pennsylvania, Philadelphia, Penn.
- REIGHARD, JACOB E. Morphology.
 Professor of Animal Morphology, University of Michigan.
Ann Arbor, Mich.
- *RICE, WILLIAM NORTH, Ph.D., LL.D. Geology.
 Professor of Geology, Wesleyan University.
Middletown, Conn.
- *RILEY, C. V., A.M., Ph.D. Biology.
 Entomologist of the U.S. Department of Agriculture, and
 Curator of Insects, U.S. National Museum.
Sunbury, Wyoming avenue, Washington, D.C.
- RITTER, WILLIAM E., A.M. Zoölogy.
 Instructor of Zoölogy, University of California.
Berkeley, Cal.
- *ROTHROCK, J. T., M.D., B.S. Botany.
 Professor of Botany, University of Pennsylvania.
West Chester, Chester Co., Penn.
- *RUSSELL, ISRAEL C. Geology.
U.S. Geological Survey, Washington, D.C.
- RYDER, JOHN A., Ph.D. Embryology.
 Professor of Comparative Embryology, University of Penn-
 sylvania.
Philadelphia, Penn.
- *SARGENT, CHARLES S. Botany.
 Professor of Arboriculture, Harvard University, and Direc-
 tor of the Arnold Arboretum.
Brookline, Mass.
- SCHIVELY, MARY A. Zoölogy.
 Teacher of Zoölogy, Friends' School, Fifteenth and Race
 streets, Philadelphia.
Academy of Natural Sciences, Philadelphia, Penn.
- *SCOTT, WILLIAM B., Ph.D. Animal Morphology.
 Professor of Geology and Palæontology, Princeton College.
Princeton, N.J.
- SCRIPTURE, EDWARD W., Ph.D. Psychology.
 Instructor in Experimental Psychology, Yale University.
New Haven, Conn.

- *SCUDDER, S. H., S.B., A.M. Entomology and Palæontology.
Palæontologist, U.S. Geological Survey.
Cambridge, Mass.
- *SEDWICK, WILLIAM T., Ph.D. Biology.
Professor of Biology, Massachusetts Institute of Technology,
Chief Biologist of the State Board of Health of Massachusetts.
Massachusetts Institute of Technology, Boston, Mass.
- SETCHELL, WILLIAM A., A.B., Ph.D. Botany.
Assistant in Biology, Yale University.
Yale University, New Haven, Conn.
- *SHARP, BENJAMIN, M.D., Ph.D. Animal Morphology.
Professor of Invertebrate Zoölogy, Academy of Natural Sciences of Philadelphia.
Academy of Natural Sciences, Philadelphia, Penn.
- *SHUFELDT, R. W., M.D., C.M.Z.S. Anatomy of Vertebrates.
Captain, Medical Department, U.S.A.
Takoma, D.C.
- SMITH, HERBERT E., Ph.B., M.D. Physiology.
Professor of Chemistry, Yale Medical School.
New Haven, Conn.
- SMITH, JOHN B. Entomology.
Professor of Entomology. Entomologist to the College Experiment Station.
New Brunswick, N.J.
- SMITH, JAMES PERRIN, A.M., Ph.D. Palæontology.
Associate Professor of Palæontology, Leland Stanford Junior University.
Palo Alto, Cal.
- SMITH, ROBERT MEADE, A.M., M.D. Physiology.
Professor of Comparative Physiology, University of Pennsylvania.
Box 418, Colorado Springs, Col.
- *SMITH, SIDNEY I., Ph.B. Biology.
Professor of Comparative Anatomy, Yale University.
147 Whalley avenue, New Haven, Conn.
- STILES, CHARLES W., Ph.D. Parasitology.
Medical Zoölogist, Bureau of Animal Industry, Department of Agriculture, Washington, D.C.
Washington, D.C.

- | | |
|--|---------------------------------------|
| STRONG, OLIVER S., M.A. | Biology. |
| Preparator in Biology, Columbia College.
<i>New York, N.Y.</i> | |
| THAXTER, ROLAND, Ph.D. | Cryptogamic Botany. |
| Assistant Professor of Cryptogamic Botany, Harvard University.
<i>3 Scott street, Cambridge, Mass.</i> | |
| TILTON, JOHN L., A.B. | Biology. |
| Professor of Natural Science, Simpson Centenary College.
<i>Indianola, Ia.</i> | |
| *TRUE, FREDERICK W., M.S. | Vertebrates. |
| Curator of Mammals, U.S. National Museum.
<i>National Museum, Washington, D.C.</i> | |
| TUCKERMAN, FREDERICK, M.D., B.Sc. | Anatomy. |
| <i>Amherst, Mass.</i> | |
| TUTTLE, ALBERT H. | Biology. |
| Professor of Biology, University of Virginia, Va.
<i>Charlottesville, Va.</i> | |
| *TYLER, J. M., A.B. | Zoölogy. |
| Professor of Zoölogy and Botany, Amherst College.
<i>Amherst, Mass.</i> | |
| VERRILL, A. E., A.M. | Zoölogy. |
| Professor of Zoölogy, Yale University.
<i>86 Whalley avenue, New Haven, Conn.</i> | |
| *WADSWORTH, M. E., A.M., Ph.D. | Mineralogy, Petrography, and Geology. |
| Director of the Michigan Mining School, and Professor of Mineralogy, Petrography, and Geology; also State Geologist of Michigan.
<i>Michigan Mining School, Houghton, Mich.</i> | |
| *WALCOTT, C. D. | Palaeontology and Geology. |
| Palaeontologist, U.S. Geological Survey, and Hon. Curator of Invertebrate Paleozoic Fossils, U.S. National Museum.
<i>National Museum, Washington, D.C.</i> | |
| WARD, HENRY A., A.M. | Natural Science. |
| Head of Ward's Natural Science Establishment.
<i>16 to 26 College avenue, Rochester, N.Y.</i> | |
| WARD, HENRY B., A.M., Ph.D. | Zoölogy. |
| Associate Professor of Zoölogy, University of Nebraska.
<i>University of Nebraska, Lincoln, Neb.</i> | |

- ***WARREN, J. W., A.B., M.D.** Physiology.
 Associate Professor of Physiology, Bryn Mawr College.
Bryn Mawr, Penn.
- WATASE, S., B.S., Ph.D.** Biology.
 Reader in Cellular Biology, University of Chicago.
Chicago, Ill.
- WHEELER, WILLIAM M.** Embryology.
 Instructor in Embryology, University of Chicago.
Chicago, Ill.
- WHITE, CHARLES D., B.S.** Palaeobotany and Geology.
 Assistant Palaeontologist, U.S. Geological Survey.
U.S. National Museum, Washington, D.C.
- WHITFIELD, R. P., M.A.** Palaeontology.
 (Late Professor at Troy, N.Y.) Curator of Geology and
 Conchology, American Museum of Natural History.
*American Museum of Natural History, 77th street and
 8th avenue, New York, N.Y.*
- ***WHITMAN, C. O., A.M., Ph.D.** Animal Morphology.
 Editor "Journal of Morphology;" Director of the Marine
 Biological Laboratory, Woods Hole, Mass.; Professor of
 Biology, University of Chicago.
Chicago, Ill.
- ***WILDER, BURT G., B.S., M.D.** Vertebrate Morphology.
 Professor of Physiology, Comparative Anatomy, and Zo-
 ology, and Curator of Vertebrate Museum, Cornell Uni-
 versity.
Cornell University, Ithaca, N.Y.
- WILDER, HARRIS H., Ph.D.** Zoölogy.
 Professor of Zoölogy, Smith College.
Northampton, Mass.
- WILLEY, ARTHUR, B.A.** Biology.
 Assistant in Biology, Columbia College.
New York, N.Y.
- ***WILLIAMS, HENRY S., Ph.D.** Geology and Palaeontology.
 Professor of Geology, Yale University, and Assistant Geolo-
 gist, U.S. Geological Survey.
Yale University, New Haven, Conn.
- ***WILSON, EDMUND B., Ph.B., Ph.D.** Animal Morphology.
 Adjunct Professor of Biology, Columbia College.
Columbia College, New York City.

- WILSON, HENRY V., A.B., Ph.D. Zoölogy.
 Professor of Biology, University of North Carolina.
Chapel Hill, N.C.
- WILSON, W. P., B.S., D.Sc. Botany.
 Professor of Physiological Botany, Department of Biology,
 University of Pennsylvania.
Philadelphia, Penn.
- WOLFF, JOHN E., A.B. Petrography.
 Assistant Professor in Petrography, Harvard University.
15 Story street, Cambridge, Mass.
- WOODWORTH, WILLIAM M., A.B., A.M. Zoölogy.
 Instructor in Microscopical Anatomy, Harvard University.
149 Brattle street, Cambridge, Mass.
- WORTMAN, J. L. Vertebrate Palæontology.
 Assistant in Palæontology, American Museum of Natural
 History.
New York, N.Y.
- WRIGHT, JAMES HOMER, A.B., M.D. Pathology, Bacteriology.
 Assistant in Pathology, Harvard Medical School.
38 St. Botolph street, Boston, Mass.
- *WRIGHT, R. RAMSAY, A.M., B.Sc. Zoölogy.
 Professor of Biology, University of Toronto, Canada.
Biological Department, University of Toronto, Canada.
- YOUNG, W. J., M.D. Biology.
 Editor of "Popular Science Monthly."
*Office of "Popular Science Monthly," Bond street, New
 York, N.Y.*

Number of honorary members	3
" " members	198
Total	201

TWELFTH MEETING, NEW HAVEN, CONN.**DECEMBER 27-28, 1893.**

The American Society of Naturalists met on Wednesday afternoon, December 27, and Thursday morning, December 28.

These meetings were held in Osborn Hall of Yale University.

The American Physiological Society held its sixth annual meeting in New Haven on December 28 and 29.

The American Morphological Society held its meetings in New Haven on December 28 and 29.

The programme of the American Society of Naturalists was as follows:

WEDNESDAY, December 27, 2.30 P.M. Meeting in Osborn Hall for the following General Business:

- I. Report of committees.
- II. Special reports.
- III. Recommendation of new members.
- IV. Discussion as to the possibility of a closer union of the affiliated societies with the Society of Naturalists.
- V. Discussion of the advisability of extending the territory in which meetings of the Society may be held.

WEDNESDAY, 8 P.M. Illustrated Lecture in Osborn Hall, by Professor Leslie A. Lee, of Bowdoin College. *Subject:* Labrador and Patagonia; a comparative study.

WEDNESDAY, 9 P.M. Immediately following the lecture a Reception was given to the members of the Society of Naturalists and of the affiliated societies, by President and Mrs. Dwight.

THURSDAY, December 28, 9.30 A.M. General Session.

- I. Election of new members.
- II. Election of officers for 1894.
- III. Other business that may arise.

THURSDAY, 10.30 A.M. Annual Discussion. *Subject:* Recent Discoveries regarding the Cell. (Addresses limited to 30 minutes each.)

I. Presentation of the subject from the chemico-physiological side. (President's address.)

Prof. R. H. CHITTENDEN, *Yale University.*

II. Consideration of the subject from the botanical side.

Prof. W. P. WILSON, *University of Penn.*

III. Consideration of the subject from the zoölogical side.

Prof. E. L. MARK, *Harvard University.*

IV. General Discussion.

THURSDAY, 7.30 P.M. Illustrated Lecture by Professor W. Libbey, Jr. *Subject:* Hawaii.

THURSDAY, 8 P.M. Annual Dinner of the Society of Naturalists and affiliated societies at the New Haven House.

The minutes of the meeting were as follows:

President Chittenden in the chair.

About forty-five members present.

The minutes of the meeting of the Executive Committee, held in Boston, were read by the Secretary:

The Executive Committee of the American Society of Naturalists met in Boston on June 6, 1893. Three members were present, Professor Chittenden, Professor Farlow, and Dr. Morgan.

Final arrangements were made to meet in New Haven on Wednesday afternoon, Dec. 27, 1893, and Thursday morning, December 28.

The annual dinner was fixed for Thursday evening.

It was arranged that the afternoon session on Wednesday should be devoted to the business of the Society, and that the morning session on Thursday should be given up to a discussion of recent discoveries regarding the cell.

It was thought advisable by the committee not to take any definite action in regard to a closer union of the Naturalists with the affiliated societies, but to refer the matter back to the Society of Naturalists. The committee *recommended*, however, that a committee be appointed from the Naturalists to confer with two members from each of the affiliated societies, to consider whether it was advisable to have a closer union with these

societies. The committee also recommended that the President of the Society of Naturalists ask the other societies to appoint such committees of conference.

The Treasurer's report was read:

TREASURER'S REPORT, 1893.

BOSTON, Dec. 26, 1893.

W. T. SEDGWICK, *Treasurer*, in account with American Society of Naturalists.

DR.

To balance, as per report Dec. 28, 1892	\$614 99
To dues for year 1893	<u>160 00</u>
	<u>\$774 99</u>

CR.

BY EXPENSES FOR YEAR 1893.

Dec. 29, 1892, T. H. Morgan, Secretary, expenses printing	\$31 25
Dec. 29, 1892, S. F. Clarke, expenses Sci- ence Committee	6 00
Jan. 5, 1893, postage, W. T. S.	5 00
Jan. 13, 1893, postage, W. T. S.	2 00
Feb. 28, 1893, Thos. Todd, printing re- ceipts	3 00
March 10, 1893, D. Appleton & Co., print- ing	21 90
May 1, T. H. Morgan, Secretary, expenses, printing, etc.	20 30
July 12, Rockwell & Churchill (records) .	53 41
Oct. 26, postage, W. T. S.	2 00
Dec. 26, T. H. Morgan, Secretary, ex- penses	<u>5 05</u>
	<u>149 91</u>
Balance	<u>\$625 08</u>

Wm. T. SEDGWICK,
Treasurer.

A committee to audit the account was appointed by the President. Professors Verrill and McMurrich were placed on the committee.

The names of candidates for admission to membership in the Society were posted. A committee to nominate officers for the ensuing year was appointed, consisting of Professors Bowditch, Farlow, Thaxter, Libbey, and Howell.

President Chittenden called for the report of the committee appointed to consider the possibility of a closer union of the affiliated societies with the Society of Naturalists.

The report was as follows:

The following members of the "Affiliation Committee" met at Osborn hall, New Haven, Conn., on Dec. 27, 1893:

C. S. Minot, W. Libbey, Jr., representing the "Naturalists."

S. I. Smith, representing the "Morphologists."

J. G. Curtis, W. P. Lombard, representing the "Physiologists."

It was unanimously voted to recommend the affiliation of the societies represented, and of the Society of Anatomists, on the following terms, viz. :

I. The affiliated societies shall elect each its own members, but none but "professionals" shall be eligible to any one of them.

Election to any one of the affiliated societies shall carry with it membership in the "Naturalists" society.

II. The common fund shall be held by the treasury of the Society of Naturalists, said fund to be used for common purposes; each society to be free to levy special assessments on its own special members, collect and expend the same.

The administrative expenses connected with calling and holding all meetings, whether general or special, of all the societies, shall be considered common purposes in the above sense.

III. The meetings of the affiliated societies to be held at the same time and place; these to be determined by a committee to consist of the presidents of the affiliated societies, *ex officio*, with the Executive Committee of the Naturalists.

IV. The only official publication to be paid for out of the common fund shall be one comprising the constitutions, by-laws, and lists of members of all the affiliated societies, together with the Secretary's records of the meetings, whether regular or special, of all the societies.

V. The affiliated societies reserve the right to form or maintain other affiliations, to meet at such other times and places, and to issue such additional publications, as they may severally determine.

This report was discussed by the following members: Professors Mark, Minot, Rice, McMurrich, Libbey, Bowditch, S. I. Smith, Conn, Chittenden, Stiles.

The main points discussed and the general results decided upon were as follows:

It was intended that a common treasurer for all the societies should hold the common treasury.

Expenses of meetings other than those of the Christmas meetings were to be met by the common treasury. The amount of money held at present by each society was to continue the property of that society.

That a report of the proceedings of all of the affiliated societies was to be published in the Records of the Society of Naturalists.

Professor Minot proposed that a copy of the resolutions of the Affiliation Committee be presented to the Geological Society, with a request to join the affiliated societies.

The report of the Affiliation Committee was accepted by the Society after a few verbal changes had been made. Professor Mark moved: That the Executive Committee make such alterations of the Constitution as the vote just passed necessitates, and submit them during the present meeting, to be adopted by the Society; but to go into effect when the proposed plan of affiliation is accepted by one or more of the following societies: Society of Anatomists, Society of Physiologists, and Society of Morphologists.

The resignation of the following members was accepted by the Society: S. F. Emmons, W. M. Davis, N. S. Shaler.

At the request of the President, Dr. Stiles reported that the Naples Table, towards which the Society at one time subscribed, had had a most successful year, and promised to be a great service to American naturalists. The table had been continuously occupied, and applications for a year ahead had been already received.

It was pointed out by the Secretary that no record had been kept by the Society of the deaths of its members. It was voted

by the Society that a list of the deceased members be made out by the Secretary and published in the Records.¹

The Treasurer in his report called the attention of the Society to the fact that there existed in the treasury the sum of \$625.08, an amount far exceeding the necessities of the Society. The Treasurer suggested that \$500 of this amount might profitably be given by the Society towards the advancement of some scientific undertaking.

Professor Minot suggested that, since the Marine Laboratory at Woods Holl was an institution doing much good to natural-history studies in this country, the amount would be well placed and fill a great need if turned over to that institution.

The question was raised and discussed whether the donation, if given, had better be given without limitations, or whether for a specific purpose. The latter suggestion seemed to meet with the approval of the Society.

Professors Andrews, Libbey, Brewer, Stiles, S. I. Smith, Farlow, Mark, spoke in regard to this matter.

It was finally voted: That the sum of \$500 be given as an *endowment to the library* of the Marine Biological Laboratory at Woods Holl, Mass.

Professor Minot spoke in regard to the duty, at present demanded, on imported microscopes and other strictly scientific instruments.

Professor Minot moved that a committee be appointed to consider the matter and report results to the Society.

Carried. Committee appointed: Professors Minot, Brewer, Andrews.

Society adjourned.

SECOND SESSION.

THURSDAY MORNING, DECEMBER 28, 1893.

A meeting of the Executive Committee was called to meet before the regular meeting of the Society. Three members present. The two following resolutions were passed:

"The Executive Committee after careful consideration deem it inadvisable at the present time to recommend any change in Sect. 1, Art. IV., of the Constitution, referring to those States where

¹It has not been possible to prepare this list for publication in the present number, but the steps necessary to complete it will be undertaken.

meetings may be held, believing that the interests of the majority will be best subserved by adhering to the original plan; and

"The Executive Committee would recommend that a committee of three be appointed by the Chair to carefully consider the changes made necessary in the Constitution by our recent action with regard to the affiliated societies. It shall be the duty of this committee to ascertain the action taken by each of these societies in this matter, and to make, in the form of a report to the spring meeting of the Executive Committee, a revision of our Constitution and By-laws, which shall carry out the results that we seek to obtain by this action."

At the meeting of the Society on Thursday morning the following business was transacted:

The committee appointed to audit the Treasurer's account reported:

That having examined the account-books of W. T. Sedgwick, Treasurer American Society of Naturalists, and having compared the accounts with the vouchers submitted, they find the accounts correct. Report accepted.

It was moved and carried that the Secretary be instructed to cast the vote of the Society for the following applicants for membership:

KATHARINE J. BUSH, Assistant in Peabody Museum of Yale University.

WESLEY R. COE, Ph.B., Assistant in Biology, Yale University.

DANIEL C. EATON, M.A., Professor of Botany, Yale University.

ALEXANDER W. EVANS, Ph.B., M.D., House Surgeon, New Haven Hospital.

HARRY B. FERRIS, Assistant Professor of Anatomy, Yale Medical School.

GEORGE WILTON FIELD, A.M., Ph.D., Associate Professor of Cellular Biology, Brown University.

LANGDON FROTHINGHAM, M.D.V., Assistant in Veterinary Science and Bacteriology, Yale University.

ROSS GRANVILLE HARRISON, B.A., Fellow of Johns Hopkins University.

ANNIE P. HENCHMAN, Cambridge, Massachusetts.

THEODORE HOUGH, Ph.D., Instructor in Physiology, Massachusetts Institute of Technology.

SIMON C. KEITH, JR., S.B., Assistant in Biology, Massachusetts Institute of Technology.

J. S. KINGSLEY, D.Sc., Professor of Zoölogy, Tufts College.

GRAHAM LUSK, Ph.D., Assistant Professor of Physiology, Yale Medical School.

JOHN M. MACFARLANE, D.Sc., Professor of Biology at the University of Pennsylvania.

S. T. MELTZER, M.D., New York City.

LAFAYETTE B. MENDEL, Ph.D., Assistant in Physiological Chemistry, Yale University.

HUGO MÜNSTERBERG, M.D., Ph.D., Professor of Experimental Psychology, Harvard University.

WINFIELD SCOTT NICKERSON, Assistant in Zoölogy, Harvard University.

MARCELLA I. O'GRADY, S.B., Professor of Biology, Vassar College.

WINTHROP J. V. OSTERHOUT, A.B., Instructor in Botany in Brown University.

WILLIAM PATTEN, A.M., Ph.D., Professor of Zoölogy, Dartmouth College.

MARY A. SCHIVELY, Teacher of Zoölogy at Friends' School, Philadelphia.

EDWARD W. SCRIPTURE, Ph.D., Instructor in Experimental Psychology, Yale University.

HERBERT E. SMITH, Ph.B., M.D., Professor of Chemistry in Yale Medical School.

JAMES HOMER WRIGHT, A.B., M.D., Assistant in Pathology, Harvard Medical School.

The committee appointed to nominate officers for the ensuing year reported as follows:

President. — C. S. MINOT.

Vice Presidents. — WILLIAM H. DALL.

WILLIAM LIBBEY, JR.

SIDNEY I. SMITH.

Secretary. — W. A. SETCHELL.

Treasurer. — E. G. GARDINER.

Committee at Large. — H. F. OSBORN.

C. W. STILES.

It was moved that the Secretary be instructed to cast the vote of the Society for these officers. Carried.

President Chittenden spoke of the duties that the retiring Treasurer and Secretary had performed for the Society. A vote "expressing the gratitude of the Society to the Treasurer and Secretary for their services to the Society" was carried.

Professor Libbey reported from the Executive Committee in regard to its action relative to the necessary changes in the Constitution. (See *ante*.) It was moved that the report be accepted. Carried.

The President appointed as members of this committee Professors Minot, Bowditch, and McMurrich.

The committee appointed on the importation of scientific and philosophical instruments presented the following report:

The committee recommends the passage of the following preamble and resolutions:

Whereas, In the opinion of this Society it is of the utmost importance for the educational and scientific development of this country that all scientific and philosophical instruments whose chief use is for instruction or research be admitted without duty:

Resolved, (1) That a petition, prepared and signed by the officers of the Society, be sent to both Houses of Congress from this Society, to request that all scientific and philosophical instruments whose chief use is for instruction or research be placed on the free list.

Resolved, (2) That a committee of five be appointed by the Society, with power to add to its numbers, to take such steps as they deem expedient to secure the passage by Congress of an act placing scientific and philosophical instruments on the free list.

Resolved, (3) That the Societies of Morphologists, Physiologists, and Anatomists be requested to appoint each a committee to coöperate with the committee appointed by this Society.

The report was accepted by the Society, and the following committee was appointed by the President: Professors Minot, H. F. Osborn, S. I. Smith, W. H. Howell, and William Libbey, Jr.

In the absence of the Treasurer, Prof. E. A. Andrews was appointed Treasurer *pro tem.*

Professor Minot spoke of the difficulties that teachers meet with in handling large classes in the laboratory, and suggested that at the next meeting of the Society the subject be discussed. Carried.

The Society then heard the two following addresses on "Recent Discoveries regarding the Cell:"

(1) Presentation of the subject from the chemico-physiological side, Prof. R. H. Chittenden.

(2) Consideration of the subject from the zoölogical side, Prof. E. L. Mark.

Prof. W. P. Wilson was unable to be present at the meeting to take the part assigned him.

In the general discussion that followed these addresses the following members took part: Professors Minot, Mark, E. B. Wilson, Morgan, Conn.

The meeting adjourned.

APPENDIX.

Immediately after the meeting a motion was carried expressing the gratitude of the members of the Society to the authorities of Yale University, and to the local committee, for the hospitable reception extended to the members of the Society.

It has been arranged by the Executive Committee that the next meeting of the Society will be held in Baltimore, Md.

The members of the Society have subscribed for an investigator's room at the Marine Biological Laboratory, Woods Holl, Mass., for the summer of 1894. Applications should be sent to the Secretary, Dr. W. A. Setchell, Yale University.

RECORDS
OF THE
AMERICAN SOCIETY
OF
NATURALISTS.

VOLUME I.

PART TWELVE.

BOSTON:
PUBLISHED BY THE SECRETARY.

1895.



RECORDS.

LIST OF OFFICERS FOR 1895.

President, E. D. COPE.

Vice-Presidents, $\begin{cases} \text{W. G. FARLOW,} \\ \text{WILLIAM LIBBEY,} \\ \text{C. O. WHITMAN.} \end{cases}$

Secretary, H. C. BUMPUS.

Treasurer, E. G. GARDINER.

*Members of the Executive Committee elected from the
Society at large.*

W. H. HOWELL.

E. B. WILSON.

LIST OF HONORARY MEMBERS.

*DANA, JAMES D., Ph.D., LL.D., Mineralogy, Zoölogy, Geology.

Professor of Geology, Yale University.

Yale University, New Haven, Conn.

LESLEY, J. P., A.M., LL.D. Geology.

State Geologist of Pennsylvania.

907 Walnut street, Philadelphia, Penn.

MARSH, O. C., Ph.D., LL.D. Palæontology.

Professor of Palæontology, Yale University.

8 Peabody Museum, New Haven, Conn.

LIST OF MEMBERS.

[An asterisk designates original membership.]

- ***ALLEN, HARRISON, M.D.** Comparative Anatomy.
1933 Chestnut street, Philadelphia, Penn.
- ALLEN, J. A., Ph.D.** Mammalogy and Ornithology.
Curator of the Department of Vertebrate Zoölogy.
American Museum of Natural History, New York, N.Y.
- ALLIS, EDWARD P., Jr.** Biology.
Associate Editor of the "Journal of Morphology."
Milwaukee, Wis.
- ANDREWS, E. A., Ph.D.** Biology.
Associate Professor in Biology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- ASHMEAD, WILLIAM.** Entomology.
Investigator in Entomology, U.S. Dept. of Agriculture.
1738 Q street, N.W., Washington, D.C.
- AYERS, HOWARD, Ph.D.** Biology.
Professor of Biology, University of Missouri.
Columbia, Mo.
- BARNHART, JOHN H., A.B., A.M.** Biology.
Tarrytown, N.Y.
- BARTON, B. W., M.D.** Botany.
Instructor in Botany, Johns Hopkins University.
University Club, Charles street, Baltimore, Md.
- BAUR, GEORGE, Ph.D.** Vertebrate Palæontology.
Assistant Professor of Comparative Osteology and Palæontology, University of Chicago.
University of Chicago, Chicago, Ill.
- ***BICKMORE, ALBERT S.**
Secretary and Professor in charge of Department of Public Instruction of the American Museum of Natural History.
American Museum, Central Park, N.Y.
- BIGELOW, R. P., Ph.D.** Animal Morphology.
Instructor in Biology, Massachusetts Institute of Technology.
Mass. Institute of Technology, Boston, Mass.

- BOLTON, H. CARRINGTON, A.M., Ph.D. Mineralogy, Chemistry.
University Club, New York City.
- *BOWDITCH, HENRY P., A.M., M.D. Physiology.
 Professor of Physiology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- BRANNER, JOHN CASPER, A.M., Ph.D. Geology.
 Professor of Geology, Leland Stanford Junior University.
Palo Alto, Cal.
- BREWER, WILLIAM H., Ph.D. Biology.
 Professor of Agriculture, Yale University.
418 Orange street, New Haven, Conn.
- *BRUSH, G. J., M.A., LL.D. Mineralogy.
 Director, Sheffield Scientific School.
New Haven, Conn.
- BUMPUS, H. C., Ph.D. Comparative Anatomy.
 Associate Professor of Zoölogy, Brown University.
Brown University, Providence, R.I.
- BURRAGE, SEVERANCE, S.B. Biology.
 Assistant Biologist, Mass. State Board of Health.
Mass. Institute of Technology, Boston, Mass.
- BUSH, KATHARINE J. Zoölogy.
 Assistant in Peabody Museum of Yale University.
133 Howe street, New Haven, Conn.
- CALKINS, G. N., B.S. Biology.
Columbia College, New York, N.Y.
- CAMPBELL, JOHN P., Ph.D. Physiology.
 Professor of Biology, University of Georgia.
Athens, Ga.
- CASEY, THOMAS L. Entomology.
 Captain, U.S. Engineer Corps.
U.S. Army Building, New York, N.Y.
- CASTLE, WILLIAM E., A.B., A.M. Zoölogy.
 Assistant in Zoölogy, Harvard University.
5 College House, Cambridge, Mass.
- CHAPIN, H. E. Biology.
 Professor of Biology, University of Ohio.
Athens, O.
- CHAPMAN, FRANK M. Mammalogy and Ornithology.
 Assistant Curator, American Museum of Natural History.
77th street and 8th avenue, New York, N.Y.

- CHITTENDEN, R. H., Ph.D.** Physiology.
 Professor of Physiological Chemistry, Yale University.
83 Trumbull street, New Haven, Conn.
- *CLARKE, SAMUEL F., Ph.B., Ph.D.** Zoölogy.
 Professor of Natural History, Williams College.
Williamstown, Mass.
- COE, WESLEY R., Ph.B.** Zoölogy.
 Assistant in Biology, Yale University.
New Haven, Conn.
- *CONN, H. W., Ph.D.** Zoölogy; Bacteriology.
 Professor of Biology, Wesleyan University.
Middletown, Conn.
- *COPE, EDWARD D.** Vertebrate Palaeontology and Zoölogy.
 Professor of Vertebrate Palaeontology, University of Pennsylvania.
2102 Pine street, Philadelphia, Penn.
- *COUES, ELLIOTT, A.M., M.D., Ph.D.** Vertebrates, Bibliography.
1726 H street, Washington, D.C.
- DALL, WILLIAM HEALEY.** Mollusca, Palaeontology.
 Palæontologist, U.S. Geological Survey, Honorary Curator
 Department of Mollusks, U.S. National Museum.
Smithsonian Institution, Washington, D.C.
- DAVENPORT, CHARLES B., A.B., A.M., Ph.D.** Zoölogy.
 Instructor in Zoölogy, Harvard University.
Cambridge, Mass.
- DEAN, BASHFORD, Ph.D.** Vertebrate Zoölogy.
 Assistant in Biology.
Columbia College, New York, N.Y.
- *DIMMOCK, GEORGE, Ph.D.** Zoölogy.
Canobie Lake, N.H.
- DOLLEY, CHARLES S.** Biology.
 Professor of Natural History in Swarthmore College.
Woodland avenue, Philadelphia, Penn.
- *DONALDSON, HENRY H., Ph.D.** Physiology.
 Professor of Neurology, University of Chicago.
Chicago, Ill.
- *DUDLEY, W. R., M.S.** Cryptogamic Botany.
 Professor of Botany, Leland Stanford Junior University.
Palo Alto, Cal.

- DWIGHT, THOMAS, A.M., M.D. Anatomy.
 Parkman Professor of Anatomy, Harvard Medical School.
235 Beacon street, Boston, Mass.
- *DWIGHT, WILLIAM B., A.B., A.M., Ph.B. Palæontology.
 Professor of Natural History and Curator of the Museum,
Vassar College.
Vassar College, Poughkeepsie, N.Y.
- EATON, DANIEL C., M.A. Botany.
 Professor of Botany, Yale University.
70 Sachem street, New Haven, Conn.
- EDWARDS, CHAS. L., A.M., Ph.D. Zoölogy.
 Professor of Zoölogy, University of Cincinnati.
Cincinnati, O.
Austin, Texas.
- ELLIOT, D. G. Mammalogy and Ornithology.
Field Columbian Museum, Chicago, Ill.
- *EMERTON, JAMES H. Zoölogy.
11 St. James avenue, Boston, Mass.
- ERNST, HAROLD C., A.M., M.D. Bacteriology.
 Assistant Professor of Bacteriology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- EVANS, ALEXANDER W., Ph.B., M.D. Botany.
12 High street, New Haven, Conn.
- *FARLOW, WM. G., A.M., M.D. Botany.
 Professor of Cryptogamic Botany, Harvard University.
Harvard University, Cambridge, Mass.
- *FERNALD, C. H., A.M., Ph.D. Microlepidoptera.
 Professor of Zoölogy, Massachusetts Agricultural College.
Amherst, Mass.
- FERNALD, HENRY T., M.S., Ph.D. Morphology.
 Professor of Zoölogy, Pennsylvania State College.
State College, Centre Co., Penn.
- FERRIS, HARRY B., M.D. Anatomy.
 Assistant Professor of Anatomy, Yale Medical School.
317 Crown street, New Haven, Conn.
- FEWKES, J. WALTER. Ethnology.
73 Pinckney street, Boston, Mass.
- FIELD, GEORGE WILTON, A.B., A.M., Ph.D. Morphology.
 Associate Professor of Cellular Biology.
Brown University, Providence, R.I.

- Fox, L. Webster, M.D.** Anatomy and Physiology.
 Clinical Assistant, Jefferson Medical College Hospital,
 Ophthalmic Surgeon to Germantown Hospital.
1304 Walnut street, Philadelphia, Penn.
- FROTHINGHAM, LANGDON, M.D.V.** Bacteriology.
Care Robt. Thode & Son, Dresden, Germany.
- FULLER, GEORGE W., S.B.** Bacteriology.
 Chief Assistant-Biologist, State Board of Health of Massachusetts.
Lawrence, Mass.
- ***GAGE, SIMON H., S.B.** Vertebrate Morphology and Physiology.
 Associate Professor of Physiology and Lecturer on Microscopical Technology, Cornell University.
Cornell University, Ithaca, N.Y.
- GANONG, WM. FRANCIS, Ph.D.** Botany.
 Professor of Botany, Smith College.
11 Massasoit street, Northampton, Mass.
- GARDINER, EDWARD G., S.B., Ph.D.** Zoölogy.
131 Mt. Vernon street, Boston, Mass.
- GARDINER, FREDERIC, A.B., A.M.** Biology.
 Instructor in Natural Science, Trinity College.
Pomfret, Conn.
- ***GERRISH, FREDERIC HENRY, A.M., M.D.** Anatomy.
 Professor of Anatomy, Bowdoin College.
675 Congress street, Portland, Me.
- ***GILBERT, G. K.** Geology.
 Geologist of the U.S. Geological Survey.
U.S. Geological Survey, Washington, D.C.
- ***GOODALE, GEORGE L., A.M., M.D.** Botany.
 Professor of Botany, Harvard University.
Cambridge, Mass.
- ***GOODE, G. BROWN, A.M., Ph.D.** Zoölogy.
 Assistant Secretary of the Smithsonian Institution in charge
 of the U.S. National Museum.
Smithsonian Institution, Washington, D.C.
- GRATACAP, L. P., M.A., Ph.B.** Mineralogy and Geology.
 Assistant Curator of Geology, American Museum of Natural History, New York.
77th street and 8th avenue, New York, N.Y.

- ***GREENLEAF, R. W., A.M., M.D.** Botany.
561 Boylston street, Boston, Mass.
- GREGORY, EMILY L., Ph.D.** Botany.
18 West 60th street, New York, N.Y.
- HAGUE, ARNOLD.** Geology and Petrography.
 Geologist, U.S. Geological Survey.
U.S. Geological Survey, Washington, D.C.
- ***HALL, JAMES M. S., A.M., M.D., LL.D.** Geology, Palæontology.
 State Geologist of New York, Director of the State Museum
 of Natural History.
State Museum, Albany, N.Y.
- HALSTED, BYRON D., D.Sc.** Botany.
 Botanist and Horticulturist, Agricultural Experiment Station.
New Brunswick, N.J.
- HARE, HOBART AMORY, B.Sc., M.D.** Physiology.
 Professor of Therapeutics in Jefferson Medical College of
 Philadelphia.
222 South Fifteenth street, Philadelphia, Penn.
- HARGITT, CHARLES W., Ph.D.** Zoölogy.
 Professor of Biology, Syracuse University.
Syracuse University, Syracuse, N.Y.
- HARRISON, ROSS GRANVILLE, A.B.** Animal Morphology.
Bryn Mawr, Penn.
- ***HEILPRIN, ANGELO.** Palæontology and Geology.
 Professor of Invertebrate Palæontology at, and Curator in
 Charge of, the Academy of Natural Sciences of Phila-
 delphia, and Professor of Geology at the Wagner Free
 Institute of Science.
Academy of Natural Sciences, Philadelphia, Penn.
- HENCHMAN, ANNIE P.** Zoölogy.
8 Frisbie place, Cambridge, Mass.
- ***HENSHAW, SAMUEL.** Zoölogy.
 Secretary, Boston Society of Natural History.
Boston Society of Natural History, Boston, Mass.
- HERRICK, F. H., A.B., Ph.D.** Biology.
 Professor of Biology, Adelbert College.
Adelbert College, Cleveland, O.
- HILL, FRANK A.** Geology.

- Geologist in Charge, Anthracite District, State Survey of Pennsylvania.
1011 South 48th street, Philadelphia, Penn.
- HODGE, CLIFTON F., A.B., Ph.D. Physiology.
 Clark University.
Worcester, Mass.
- HOUGH, THEODORE, B.A., Ph.D. Biology.
 Instructor in Physiology, Massachusetts Institute of Technology.
Massachusetts Institute of Technology, Boston, Mass.
- HOWELL, WILLIAM H., A.B., Ph.D. Physiology.
 Professor of Physiology, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- HUMPHREY, JAMES ELLIS, S.B., S.D. Botany.
 Fellow, Johns Hopkins University.
Baltimore, Md.
- *HYATT, ALPHEUS, S.B. Palæontology and Zoölogy.
 Curator of the Boston Society of Natural History, and Assistant in Museum of Comparative Zoölogy, at Cambridge, Mass.
Boston Society of Natural History, Boston, Mass.
- IVES, J. E. Invertebrate Zoölogy.
Drexel Institute of Art, Science, and Industry, Philadelphia, Penn.
- JACKSON, ROBERT TRACY, S.B., S.D. Zoölogy and Palæontology.
33 Gloucester street, Boston, Mass.
- JAYNE, HORACE, M.D. Vertebrata.
 Professor of Vertebrate Morphology, University of Pennsylvania.
1826 Chestnut street, Philadelphia, Penn.
- JOHNSON, HERBERT P., A.M. Biology.
University of Chicago.
- JORDAN, DAVID STARR, M.S., M.D., Ph.D., LL.D. Biology.
 President of Leland Stanford Junior University.
Palo Alto, Cal.
- JORDAN, EDWIN O., S.B., Ph.D. Biology.
 Tutor in Anatomy, University of Chicago.
Chicago, Ill.

- LOTSY, T. P., Ph.D. Botany.
Associate in Botany, Johns Hopkins University.
Baltimore, Md.
- LUCAS, FREDERIC A. Avian Osteology.
Curator, Department of Comparative Anatomy, U.S. National Museum.
Washington, D.C.
- LUSK, GRAHAM, Ph.D. Physiology.
Assistant Professor of Physiology, Yale Medical School.
New Haven, Conn.
- MACFARLANE, JOHN M., B.S., D.Sc. Botany.
Professor of Biology, University of Pennsylvania.
Lansdowne, Penn., or Department of Biology, University of Pennsylvania, Philadelphia, Penn.
- *MACCOSKIE, GEORGE, D.Sc., LL.D. Biology.
Professor of Biology, Princeton College.
Princeton, N.J.
- MALL, F. P., M.D. Histology and Vertebrate Embryology.
Professor of Anatomy, Johns Hopkins University.
Johns Hopkins University, Baltimore, Md.
- MARK, EDWARD L., A.M., Ph.D. Hersey Professor of Anatomy, Harvard University.
109 Irving street, Cambridge, Mass.
- *MARSHALL, JOHN P., A.M. Mineralogy and Geology.
Professor of Mineralogy and Geology, Tufts College.
College Hill, Mass.
- *MARTIN, H. NEWELL, A.M., M.D., D.Sc., F.R.S. Physiology.
Physiological Laboratory, University of Cambridge.
Cambridge, England.
- McCLURE, CHARLES F. W., A.B. Embryology and Vertebrate Morphology.
Instructor in Biology at Princeton College.
Princeton, N.J.
- *MCGEE, W. J. Geology.
Geologist, U.S. Geological Survey.
U.S. Geological Survey, Washington, D.C.
- McMURRICH, J. PLAYFAIR, A.M., Ph.D. Animal Morphology.
Professor of Anatomy, University of Michigan.
86 S. State street, Ann Arbor, Mich.

- * MEEHAN, THOMAS. Botany.
Botanist to the Pennsylvania State Board of Agriculture ;
Vice-President, Academy of Natural Sciences, Philadelphia.
Germantown, Penn.
- MELTZER, S. J., M.D. Physiology.
66 East 124th street, New York City.
- MENDEL, LAFAYETTE B., A.B., Ph.D. Physiology.
Instructor in Physiological Chemistry, Yale University.
22 Trumbull street, New Haven, Conn.
- *MERRIAM, C. HART, M.D. Mammals and Birds.
Chief of Division of Economic Ornithology and Mammalogy
of the U.S. Department of Agriculture.
Washington, D.C.
- *MERRILL, F. J. H., Ph.D. Geology.
Assistant State Geologist of New York.
State Museum, Albany, N.Y.
- METCALFE, MAYNARD, M., Ph.D. Morphology.
Associate Professor of Biology, Woman's College of Baltimore.
Baltimore, Md.
- MILLS, T. WESLEY, M.D. Biology.
Professor of Physiology, McGill University.
Côte St. Antoine, Montreal, Canada.
- *MINOT, CHARLES SEDGWICK, S.B., S.D. Biology.
Professor of Histology and Human Embryology, Harvard Medical School.
Harvard Medical School, Boston, Mass.
- MIXTER, SAMUEL J., B.S., M.D. Anatomy.
180 Marlborough street, Boston, Mass.
- MORGAN, THOS. HUNT, B.S., Ph.D. Biology.
Associate Professor of Biology, Bryn Mawr College.
Bryn Mawr, Penn.
- *MORSE, EDWARD S., A.M., Ph.D. Anthropology and Zoölogy.
Director of the Peabody Academy of Science, Salem, Mass.
Salem, Mass.
- MÜNSTERBERG, HUGO, M.D., Ph.D. Psychology.
Professor of Experimental Psychology, Harvard University.
38 Quincy street, Cambridge, Mass.

- NICHOLS, HERBERT, Ph.D. Psychology.
 Instructor in Psychology, Harvard University.
12 Kirkland place, Cambridge, Mass.
- NICKERSON, WINFIELD S., S.D. Zoölogy.
 Professor of Biology.
Boulder, Col.
- *NILES, WILLIAM H., Ph.B., A.M. Physical Geography and Historical Geology.
 Professor of Geology and Geography, Massachusetts Institute of Technology.
Massachusetts Institute of Technology, Boston, Mass.
- O'GRADY, MARCELLA I., S.B. Professor of Biology, Vassar College.
Vassar College, Poughkeepsie, N.Y.
- *OSBORN, HENRY FAIRFIELD, Sc.D. Vertebrate Morphology.
 Da Costa Professor of Biology, Columbia College, Curator of Department of Mammalian Palæontology, American Museum of Natural History, N.Y.
Columbia College, New York City.
- OSTERHOUT, WINTHROP J. V., A.M. Botany.
 Instructor in Botany, Brown University.
Brown University, Providence, R.I.
- *PACKARD, A. S., A.M., M.D., Ph.D. Zoölogy.
 Professor of Zoölogy and Geology, Brown University.
Brown University, Providence, R.I.
- PARKER, GEORGE HOWARD, S.B., S.D. Animal Morphology.
 Instructor in Zoölogy, Harvard University.
6 Avon place, North Cambridge, Mass.
- PATTEN, WILLIAM, B.S., Ph.D., A.M. Professor of Zoölogy, Dartmouth College.
Hanover, N.H.
- *PEALE, A. C., A.M., M.D. Geology.
 Geologist, U.S. Geological Survey.
Geological Survey, Washington, D.C.
- PECK, JAMES I., A.M. Zoölogy.
 Professor of Biology, Williams College.
Williamstown, Mass.
- PENFIELD, SAMUEL L., Ph.B. Mineralogy.
 Professor of Mineralogy, Yale University.
Sheffield Scientific School, New Haven, Conn.

- PHILLIPS, ALEXANDER H., S.B.** Vertebrate Anatomy.
 Instructor in Biology at Princeton College.
Princeton, N.J.
- *PILLSBURY, J. H.** Biology.
50 Mattoon street, Springfield, Mass.
- PORTER, HOBART C., Ph.D.** Botany.
 Biological Department, University of Pennsylvania.
Philadelphia, Penn.
- PRATT, HENRY S., Ph.D.** Zoölogy.
 Instructor in Biology, Haverford College.
Haverford, Penn.
- *PRENTISS, Albert N., S.M.** Botany.
 Professor of Botany, Horticulture, and Arboriculture, Cornell University.
Cornell University, Ithaca, N.Y.
- PROSSER, CHARLES S., S.M.** Geology and Palæontology.
 Professor of Geology and Palæontology, Union College.
Schenectady, N.Y.
- *PUTNAM, FREDERICK W.** Archæology and Ethnology.
 Peabody Professor of American Archæology and Ethnology,
 Harvard University; Curator of the Peabody Museum of Archæology and Ethnology, in connection with Harvard University; Permanent Secretary of the American Association for the Advancement of Science; and Massachusetts State Commissioner on Inland Fisheries.
Peabody Museum, Cambridge, Mass.
- PYNCHON, W. H. C., M.A.** Geology.
 Instructor in Natural Science, Trinity College.
Hartford, Conn.
- RANKIN, WALTER M., A.M., M.Sc., Ph.D.** Biology.
 Instructor in Biology and Curator of Museum, Princeton College.
Box 23, Princeton, N.J.
- *RATHBUN, RICHARD, S.M.** Invertebrates.
 Curator, Dep't of Marine Invertebrates, National Museum.
U.S. Fish Commission, Washington, D.C.
- REICHART, EDWARD T., M.D.** Physiology.
 Professor of Physiology, University of Pennsylvania.
University of Pennsylvania, Philadelphia, Penn.

- REIGHARD, JACOB E., Ph.B.** Morphology.
 Professor of Animal Morphology, University of Michigan.
Ann Arbor, Mich.
- *RICE, WILLIAM NORTH, Ph.D., LL.D.** Geology.
 Professor of Geology, Wesleyan University.
Middletown, Conn.
- *RILEY, C. V., A.M., Ph.D.** Biology.
 Entomologist of the U.S. Department of Agriculture, and
 Curator of Insects, U.S. National Museum.
2135 Wyoming avenue, Washington, D.C.
- RITTER, WILLIAM E., A.M.** Zoölogy.
 Instructor of Zoölogy, University of California.
Berkeley, Cal.
- *RUSSELL, ISRAEL C.** Geology.
U.S. Geological Survey, Washington, D.C.
- RYDER, JOHN A., Ph.D.** Embryology.
 Professor of Comparative Embryology, University of Penn-
 sylvania.
Philadelphia, Penn.
- *SARGENT, CHARLES S., A.B.** Botany.
 Professor of Arboriculture, Harvard University, and Direc-
 tor of the Arnold Arboretum.
Brookline, Mass.
- SCHIVELY, MARY A.** Zoölogy.
 Teacher of Zoölogy, Friends' School, Fifteenth and Race
 streets, Philadelphia.
1503 Centennial avenue, Philadelphia, Penn.
- SCHUCHERT, CHARLES.** Invertebrate Palaeontology.
 Assistant Curator, U.S. National Museum.
Washington, D.C.
- *SCOTT, WILLIAM B., Ph.D.** Animal Morphology.
 Professor of Geology and Palaeontology, Princeton College.
Princeton, N.J.
- SCRIPTURE, EDWARD W., Ph.D.** Psychology.
 Instructor in Experimental Psychology, Yale University.
109 Elm street, New Haven, Conn.
- *SCUDDER, S. H., S.B., A.M.** Entomology and Palaeontology.
 Palaeontologist, U.S. Geological Survey.
Cambridge, Mass.

- ***SEDGWICK, WILLIAM T., Ph.D.** Biology.
 Professor of Biology, Massachusetts Institute of Technology,
 Chief Biologist of the State Board of Health of Massachusetts.
Massachusetts Institute of Technology, Boston, Mass.
- SETCHELL, WILLIAM A., Ph.D.** Botany.
 Instructor in Biology, Yale University.
Yale University, New Haven, Conn.
- ***SHARP, BENJAMIN, M.D., Ph.D.** Animal Morphology.
 Professor of Invertebrate Zoölogy, Academy of Natural Sciences of Philadelphia.
Academy of Natural Sciences, Philadelphia, Penn.
- ***SHUFELDT, R. W., M.D., C.M.Z.S.** Anatomy of Vertebrates.
 Associate in Zoölogy, Smithsonian Institution.
Washington, D. C.
- SMITH, HERBERT E., Ph.B., M.D.** Physiology.
 Professor of Chemistry, Yale Medical School.
430 George street, New Haven, Conn.
- SMITH, JOHN B., S.D.** Entomology.
 Professor of Entomology. Entomologist to the College Experiment Station.
New Brunswick, N.J.
- SMITH, JAMES PERRIN, A.M., Ph.D.** Palæontology.
 Associate Professor of Palæontology, Leland Stanford Junior University.
Palo Alto, Cal.
- SMITH, ROBERT MEADE, A.M., M.D.** Physiology.
 Professor of Comparative Physiology, University of Pennsylvania.
Box 418, Colorado Springs, Col.
- ***SMITH, SIDNEY I., M.A.** Biology.
 Professor of Comparative Anatomy, Yale University.
147 Whalley avenue, New Haven, Conn.
- STILES, CHARLES W., Ph.D.** Parasitology.
 Medical Zoölogist, Bureau of Animal Industry, Department of Agriculture, Washington, D.C.
Washington, D. C.
- STRONG, OLIVER S., M.A.** Biology.
 Preparator in Biology, Columbia College.
New York, N.Y.

- THAXTER, ROLAND, Ph.D. Cryptogamic Botany.
Assistant Professor of Cryptogamic Botany, Harvard University.
3 Scott street, Cambridge, Mass.
- TILTON, JOHN L., A.B. Biology.
Professor of Natural Science, Simpson Centenary College.
Indianola, Ia.
- *TRUE, FREDERICK W., M.S. Vertebrates.
Curator of Mammals, U.S. National Museum.
National Museum, Washington, D.C.
- TUCKERMAN, FREDERICK, M.D., B.Sc. Anatomy.
Amherst, Mass.
- TUTTLE, ALBERT H. Biology.
Professor of Biology, University of Virginia, Va.
Charlottesville, Va.
- *TYLER, J. M., A.B. Zoölogy.
Professor of Zoölogy and Botany, Amherst College.
Amherst, Mass.
- VERRILL, ADDISON E., A.M. Zoölogy.
Professor of Zoölogy, Yale University.
86 Whalley avenue, New Haven, Conn.
- *WALCOTT, CHARLES D. Palæontology and Geology.
Palæontologist, U.S. Geological Survey, and Hon. Curator
of Invertebrate Palæozoic Fossils, U.S. National Museum.
U.S. Geological Survey, Washington, D.C.
- WARD, HENRY A., A.M. Natural Science.
Head of Ward's Natural Science Establishment.
16 to 26 College avenue, Rochester, N.Y.
- WARD, HENRY B., A.M., Ph.D. Zoölogy.
Associate Professor of Zoölogy, University of Nebraska.
University of Nebraska, Lincoln, Neb.
- *WARREN, J. W., A.B., M.D. Physiology.
Associate Professor of Physiology, Bryn Mawr College.
Bryn Mawr, Penn.
- WATASE, S., B.S., Ph.D. Biology.
Reader in Cellular Biology, University of Chicago.
Chicago, Ill.
- WHEELER, WILLIAM M., Ph.D. Embryology.
Instructor in Embryology, University of Chicago.
Chicago, Ill.

- WHITE, CHARLES D., B.S. Palæobotany and Geology.
 Assistant Palæontologist, U.S. Geological Survey.
U.S. National Museum, Washington, D.C.
- WHITFIELD, R. P., M.A. Palæontology.
 (Late Professor at Troy, N.Y.) Curator of Geology and
 Conchology, American Museum of Natural History.
*American Museum of Natural History, 77th street and
 8th avenue, New York, N.Y.*
- *WHITMAN, C. O., A.M., Ph.D. Animal Morphology.
 Editor "Journal of Morphology;" Director of the Marine
 Biological Laboratory, Woods Hole, Mass.; Professor of
 Biology, University of Chicago.
Chicago, Ill.
- *WILDER, BURT G., B.S., M.D. Vertebrate Morphology.
 Professor of Physiology, Comparative Anatomy, and Zo-
 ology, and Curator of Vertebrate Museum, Cornell Uni-
 versity.
Cornell University, Ithaca, N.Y.
- WILDER, HARRIS H., Ph.D. Zoölogy.
 Professor of Zoölogy, Smith College.
Northampton, Mass.
- WILLEY, ARTHUR, B.A. Biology.
 Assistant in Biology, Columbia College.
New York, N.Y.
- *WILLIAMS, HENRY S., Ph.D. Geology and Palæontology.
 Professor of Geology, Yale University, and Assistant Geolo-
 gist, U.S. Geological Survey.
Yale University, New Haven, Conn.
- *WILSON, EDMUND B., Ph.B., Ph.D. Animal Morphology.
 Adjunct Professor of Biology, Columbia College.
Columbia College, New York City.
- WILSON, HENRY V., A.B., Ph.D. Zoölogy.
 Professor of Biology, University of North Carolina.
Chapel Hill, N.C.
- WILSON, W. P., B.S., D.Sc. Botany.
 Professor of Physiological Botany, Department of Biology,
 University of Pennsylvania.
Philadelphia, Penn.

- WOODWORTH, WILLIAM M., A.B., A.M. Zoölogy.
 Instructor in Microscopical Anatomy, Harvard University.
149 Brattle street, Cambridge, Mass.
- WORTMAN, J. L. Vertebrate Palæontology.
 Assistant in Palæontology, American Museum of Natural
 History.
New York, N.Y.
- WRIGHT, JAMES HOMER, A.B., M.D. Pathology, Bacteriology.
 Assistant in Pathology, Harvard Medical School.
38 St. Botolph street, Boston, Mass.
- *WRIGHT, R. RAMSAY, A.M., B.Sc. Zoölogy.
 Professor of Biology, University of Toronto, Canada.
Biological Department, University of Toronto, Canada.
- WYLD, NORMAN. Biology.
 Late Assistant in Biology with Prof. Lloyd Morgan, Bristol,
 England.
146 S. Elliot Place, Brooklyn, N.Y.
- YOUNANS, WILLIAM J., M.D. Biology.
 Editor of "Popular Science Monthly."
72 Fifth avenue, New York, N.Y.

Number of honorary members	3
" " members	198
Total	201

THIRTEENTH MEETING, BALTIMORE, MD.

DECEMBER 27-28, 1894.

The American Society of Naturalists met on Thursday afternoon, December 27, and Friday morning, December 28.

These meetings were held in the Physical Laboratory of the Johns Hopkins University.

The American Physiological Society held its seventh meeting in Baltimore on December 27 and 28.

The American Morphological Society held its meetings in Baltimore on December 27 and 28.

The programme of the American Society of Naturalists was as follows:

THURSDAY, December 27, 2 P.M. Meeting in the Physical Laboratory for the following General Business:

I. Reports of committees.

II. Special reports.

III. Recommendation of new members.

IV. Discussion. *Subject:* Environment in its Influence upon the Successive Stages of Development, and as a Cause of Variation.

Prof. H. F. OSBORN, *Columbia College.*

Prof. E. B. WILSON, *Columbia College.*

Prof. W. K. BROOKS, *Johns Hopkins University.*

Doctor C. HART MERRIAM, *U.S. Dept. of Agriculture.*

THURSDAY, 8 P.M. Illustrated lecture in Levering Hall by Professor William Libbey, Jr., of Princeton University.
Subject: Two Months in Greenland.

THURSDAY, 9 P.M. The Johns Hopkins University invited the members of the Society and their friends to a social assembly in McCoy Hall.

FRIDAY, December 28, 9 A.M. General Session.

- I. Election of new members.
- II. Election of officers for 1895.
- III. Other business that may arise.

FRIDAY, 10 A.M.

- I. President's Address. *Subject:* The Work of the Naturalist in the World.

Prof. C. S. MINOT, *Harvard University.*

- II. Annual Discussion. *Subject:* Laboratory Teaching of Large Classes. (Addresses limited to 30 minutes each.)

1. Introductory.

Prof. ALPHEUS HYATT, *Boston Society of Natural History.*

2. Zoölogical.

Prof. H. C. BUMPUS, *Brown University.*

3. Botanical.

Prof. W. F. GANONG, *Smith College.*

4. General Discussion.

FRIDAY, 7.30 P.M. Annual Dinner of the Society of Naturalists and affiliated societies at The Stafford.

MINUTES.

FIRST SESSION.

Thursday, December 27, 2 P.M.

President Minot in the chair, and a quorum being present, the Society proceeded to the transaction of business.

The minutes of the meetings of the Executive Committee were read by the Secretary.

The Executive Committee met at Woods Hole on August 7, 1894, Professor Minot, Dr. Gardiner, and the Secretary being present. The dates of the annual meeting were fixed for Thursday, December 27, and Friday, December 28. The annual dinner was fixed for Friday, December 28, at 8 P.M. The table at the Marine Biological Laboratory for the summer of 1894, sub-

scribed for by the members of the Society, was assigned to Wesley R. Coe, Assistant in Biology in Yale University.

The Executive Committee, consulted by a letter dated November 15, 1894, authorized the President as follows:

1. To appoint a committee to arrange the programme for the coming meeting. This committee, according to the By-Laws, must include the Secretary and two others. Professors S. I. Smith and H. F. Osborn were recommended.

2. To authorize Professor H. F. Osborn to arrange for a discussion on "Environment and Variation," to include not more than four papers, of not more than twenty minutes' length each, and to request Professor Osborn to prepare the introductory paper.

3. To authorize the President to have two or three papers prepared on Laboratory teaching of large classes, one paper by Prof. H. C. Bumpus, another by Prof. A. Hyatt, or a substitute, and a third by some botanist or geologist.

4. To recommend to the Society to change the Constitution, Article II., Section II., by striking out the words "of two dollars."

5. To recommend that a By-Law be passed to fix the amount of the annual dues at two dollars.

At a meeting held in Baltimore on the morning of Thursday, December 27, there being present President Minot, Professor Osborn, Dr. Gardiner, Dr. Stiles, and the Secretary, action was taken as follows:

1. The new members proposed later are recommended to the Society for election.

2. The Report of the Committee on the Constitution is recommended for acceptance.

3. It is recommended that the Treasurer be authorized to expend a sum not exceeding twenty dollars for clerical assistance.

The Treasurer's report was read:

TREASURER'S REPORT, 1894.

E. G. GARDINER, *Treasurer*, in account with American Society
of Naturalists.

Dr.	•
Balance from 1893	\$625 08
Dues received in 1894	195 00
	<hr/>
	\$820 08
Cr.	•
Jan. 5, postage and envelopes	\$3 00
Jan. 28, postage and envelopes	4 00
Jan. 26, Laurence Minot, Treasurer of the Marine Biological Laboratory	500 00
Feb. 3, Thomas Todd	4 00
April 8, Prof. S. I. Smith	22 44
April 8, Rockwell & Churchill	58 25
April 8, Alfred Mudge & Son	7 00
April 8, Prof. T. H. Morgan	14 15
April 17, postage	2 00
	<hr/>
Total expenses	614 84
	<hr/>
Balance	\$205 24

EDW. G. GARDINER,
Treasurer.

An Auditing Committee, consisting of Dr. Bigelow and Dr. Harrison, was appointed by the President.

The report of the committee on the changes made necessary in the Constitution was read by the Secretary as follows:

To the Executive Committee of the American Society of Naturalists:

The committee appointed by the Society at its last annual meeting to report upon the changes in the Constitution and By-Laws made necessary by the action of the Society in regard to the affiliation of kindred societies, begs to present the following report:

No changes are necessary in Articles I., II., and III. of the Constitution. The committee recommends that the succeeding articles shall be as follows:

ARTICLE IV.

Meetings.

SECTION I. The annual meeting shall be held during the week following Christmas, at such time and place as shall be designated by a committee consisting of the President of this Society and the presidents of the affiliated societies.

SECTION II. Special meetings may be appointed at any time by a vote of the Society or of the Executive Committee.

ARTICLE V.

Quorum.

Seven members shall constitute a quorum of the Society, and three a quorum of the Executive Committee.

ARTICLE VI.

A committee shall be appointed at each annual meeting to audit the accounts of the Treasurer for the year closing with that meeting.

ARTICLE VII.

SECTION I. It shall be the policy of this Society, by correspondence and otherwise, to encourage the formation and coöperate in the work of societies of similar name and object in other parts of the country, and also to encourage the affiliation with it of societies whose chief object is to promote the advancement of knowledge in any of the various departments of Natural History.

SECTION II. Societies having the object mentioned in the last paragraph of Section I. of this Article, on application and on

recommendation of the Executive Committee of this Society, may be admitted to affiliation with this society at any annual meeting by a majority vote of the members present. Application for affiliation by any society shall be held to carry with it an agreement on the part of the said society to the conditions of affiliation as set forth in the "Terms of Affiliation" as adopted by this Society, as set forth in By-Law No. 4.

ARTICLE VIII.

Publications.

The only official publication of the Society shall be one comprising the Constitution, By-Laws, and list of members of the Society and of the affiliated societies, together with the Secretary's record of the meetings, whether regular or special, of all the societies.

ARTICLE IX.

By-Laws.

SECTION I. By-Laws recommended by the Executive Committee may be adopted at any meeting by a majority vote.

SECTION II. By-Laws may be repealed at any meeting, upon recommendation of the Executive Committee, by a majority vote.

ARTICLE X.

Amendments.

Amendments to this Constitution, recommended by the Executive Committee, may be adopted at any annual meeting by a vote of two-thirds of the members present.

With regard to the By-Laws, the committee begs to recommend that By-Laws 1-3 be allowed to stand unaltered, and that there be added a By-Law, No. 4, as follows:

4. SECTION I. The affiliated societies shall each elect its own members, but only such persons as are indicated in By-Law No. 2 of this Society shall be eligible to membership in any one of them. Members of affiliated societies shall be *ipso facto* members of the American Society of Naturalists, and it shall be the duty of the Secretary of each of the affiliated Societies to give written notice of any alterations which may occur in the member-

ship of the Society of which he is Secretary, to the Secretary of the American Society of Naturalists.

SECTION II. The annual meeting of the affiliated societies shall be held at the same place and time as the annual meeting of this Society.

SECTION III. The proceeds of the annual assessment mentioned in Article I., Section II., of this Constitution shall be held by the treasury of the American Society of Naturalists as a common fund (1) for the defrayment (*a*) of the administrative expense connected with the calling and holding of all meetings, whether general or special, of both the Society of Naturalists and the affiliated societies, and (*b*) of the expenses connected with the official publication; and (2) for application to such other purposes as the Society may from time to time determine upon.

SECTION IV. Such moneys as may be in the treasury of any society at the time of its admission to affiliation with the Society of Naturalists shall not become a part of the common fund, but shall continue to be the special property of the said society.

SECTION V. Each of the affiliated societies shall reserve the right of levying special assessments on its own members, and of collecting and expending the same; of holding special meetings at such times and places as it may determine upon; of issuing special publications; and of forming and maintaining such other affiliations as it may desire.

All of which is respectfully submitted.

J. PLAYFAIR McMURRICH.

The Society adopted by unanimous votes both the changes proposed in the Constitution and in the By-Laws.

The report of the Committee on the Repeal of the Duty on Scientific and Philosophical Apparatus was read by the Secretary:

REPORT OF THE COMMITTEE ON THE REPEAL
OF THE DUTY ON SCIENTIFIC AND PHILO-
SOPHICAL APPARATUS.

Your committee report that they prepared the following petition, which has been very numerously signed and duly presented to Congress:

We, the undersigned, respectfully petition the Senators and Representatives of the United States, in Congress assembled, to remove all duties upon scientific and philosophical apparatus, whose chief use is for instruction or research.

It is evident that the welfare and prosperity of the entire country depends primarily upon the education of the people and the diffusion of knowledge, and that, to secure happiness at home and success in commercial competition abroad, every practical means to improve education and advance science must be utilized unhesitatingly. To fail in this respect is to fail in patriotism. Education is the foundation of national well-being, and the demands of education must precede, therefore, all other special demands. In a government like ours, "of the people, by the people, for the people," education is rightly regarded as the corner-stone of the whole fabric.

It is indispensable for teachers and investigators of all branches of natural science to obtain numerous pieces of apparatus, most of which are incapable of use for other purposes than those of instruction and research. The duties upon such apparatus act as a direct, serious, and unpatriotic interference with the education of the country, and injure the whole nation to an incalculably vast extent. Experience shows that the provision now in force for the free importation of scientific instruments by institutions is entirely inadequate to remedy the great evil.

Finally, the duty collected on scientific and philosophical apparatus imported into this country, while a serious tax upon individuals, is so limited in amount that the loss consequent upon the removal of the duty will be insignificant compared to the gain, which will be for the highest purposes of the whole people.

NAMES.	OFFICIAL TITLES.

Two copies of this petition were sent to every member of the Society, together with the accompanying letter:

HARVARD MEDICAL SCHOOL,
BOSTON, MASS., Jan. 9, 1894.

MY DEAR SIR: It is my duty, as Chairman of the committee appointed by the American Society of Naturalists to secure the repeal of the duties on Scientific Apparatus, to ask for your active coöperation. On behalf of the committee I request you:

First. — To write personal letters to your Senators and Representatives, urging them to give their active support to the petition of the Society.

Second. — To obtain as many signatures as possible to the enclosed petition, and then forward it to the Hon. H. C. LODGE, U.S. Senate, Washington, D.C., who has consented to present the petitions to Congress.

Third. — To have petitions similar in purport sent to Congress by all the scientific societies with which you are connected.

In conclusion, permit me to add that, if our efforts are to produce effect, our action must be taken with the utmost promptitude. I have the honor to remain,

Yours, with great respect,

CHARLES SEDGWICK MINOT,
Chairman.

The signatures were so numerous and representative of the various natural sciences, that it is evident that the opinion of the scientific men of the United States is almost, perhaps absolutely, unanimous in favor of the repeal of the duty.

Your committee regrets extremely that action was taken so late that the tariff bill was before the Senate before your petition could be presented to the House, and that in spite of their earnest

and continued efforts it was impossible to have the desired alteration incorporated in the Gorman bill.

Inasmuch as the repeal of the present iniquitous duty on scientific instruments is imperatively needed by the interests of the country, we recommend that a committee be appointed to present our just demands to the President, to the Chairman of the Committee on Finance of the Senate, and the Chairman of the Committee of Ways and Means of the House of Representatives, and to take such other steps as may be practicable to secure the immediate repeal of the duty.

(Signed)

CHARLES S. MINOT, *Chairman*,
HENRY F. OSBORN,
SIDNEY I. SMITH,
WILLIAM LIBBEY, JR.

The report of the committee was accepted by the Society, and the recommendation in regard to the appointment of a committee adopted.

The recommendations of the Executive Committee in regard to the annual assessment, as given before, received the consent of the Society.

The names of the candidates for admission into the Society were read and posted by the Secretary.

A committee to nominate officers for the ensuing year was appointed by the President, consisting of Professors S. F. Clarke, Kingsley, Lee, Lotsy, and Osborn.

The resignations of the following members were accepted: W. B. Clarke, J. P. Merrill, C. A. Oliver, J. W. Peckham, J. T. Rothrock, and M. E. Wadsworth.

The Society passed a resolution instructing the Secretary to renew the invitation to the American Society of Anatomists to affiliate, and to send a similar invitation to the American Psychological Association.

The Society then listened to the discussion upon "Environment in its Influence upon the Successive Stages of Development, and as a Cause of Variation."

Prof. H. F. Osborn, of Columbia College, introduced the subject;

Prof. E. B. Wilson, of Columbia College, discussed the changes in our views brought about by experimental embryological study;

Prof. W. K. Brooks took up the discussion from the point of genealogies; and

Dr. C. H. Merriam contributed illustrations from the protective coloration and dynamic variations of birds and mammals.

Remarks were made upon this subject by C. S. Minot, E. D. Cope, A. S. Hyatt, and C. V. Riley.

The Society then adjourned to listen to Prof. E. B. Wilson, who explained a satisfactory process of photographing microscopic preparations, showing the cytological changes taking place during maturation, fecundation, and segmentation. Photographs thus taken were thrown upon the screen by the stereopticon.

SECOND SESSION.

Friday morning, December 28, 1895.

With the President in the chair, and a quorum present, the Society proceeded to business at 9.30 A.M. The following persons were elected members of the Society:

WILLIAM ASHMEAD, U.S. Department of Agriculture.

SEVERANCE BURRAGE, Mass. Institute of Technology.

W. E. CASTLE, Harvard University.

H. E. CHAPIN, University of Ohio.

J. E. HUMPHREY, Johns Hopkins University.

M. M. METCALF, The Woman's College of Baltimore.

H. C. PORTER, University of Pennsylvania.

W. H. C. PYNCHON, Trinity College, Hartford.

CHARLES SCHUEBERT, U.S. National Museum.

NORMAN WYLD, Brooklyn, N.Y.

Professor Kingsley detailed to the Society the scheme of Dr. H. H. Field by which certain needed reforms were proposed in the bibliography of zoölogical literature. Professor Osborn moved that a committee of seven (amended to five by Professor Cope) be appointed by the President to consider the ways and means, and supporting Dr. Field in his work, and that this committee report in print both in the *American Naturalist* and in *Science*.

This motion as amended was adopted by the Society, and the President appointed the following committee: S. H. Scudder, Chairman; J. S. Kingsley, Secretary; H. F. Osborn, H. P. Bowditch, and E. A. Andrews.

The report of the Auditing Committee was received, and the report of the Treasurer was accepted by the Society.

The Nominating Committee reported as follows:

President.

PROF. EDWARD D. COPE, of the University of Pennsylvania.

Vice-Presidents.

PROF. WILLIAM LIBBEY, Jr., of Princeton University.

PROF. W. G. FARLOW, of Harvard University.

PROF. C. O. WHITMAN, of the University of Chicago.

Secretary.

PROF. H. C. BUMPUS, of Brown University.

Treasurer.

Dr. E. G. GARDINER, Boston.

Executive Committee.

PROF. E. B. WILSON, of Columbia College.

PROF. W. H. HOWELL, of Johns Hopkins University.

It was moved that the Secretary be instructed to cast the ballot of the Society for these officers. The motion was carried.

Professor Bumpus called the attention of the Society to the fact that the American table at the Naples Station was not equipped with instruments, and the occupant was compelled to carry his own with him, at a considerable inconvenience and expense. He therefore moved that a sum, not to exceed \$130, be taken from the funds of the Society for the purchase of one or more microtomes to be deposited with the Zoölogical Station at Naples for the use of the American investigators, the instruments, however, to remain the property of the Society, and that a committee of three be appointed to attend to this matter.

The Society adopted this motion, and the President appointed

